NoiseMap five

User Reference Manual

The features described in this User Guide may not be available on all installations.

NoiseMap Ltd reserves the right to alter products and specifications without notification. The operation and appearance of features may differ from the description in this User Guide. See on-line help or our website for information on any changes made since the publication of this manual. We would be grateful if users would bring any discrepancies to our attention.

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NOISEMAP FIVE – PRINCIPAL FEATURES

NoiseMap five is fully-professional software for the assessment of environmental noise from road, railway and all type of open-site and industrial projects. It has been developed by acoustics, civil, transportation and software engineering professionals to provide all the functionality needed in noise mapping and assessment, in the evaluation and evolution of projects, including the design of mitigation, the evaluation of alternatives and in the provision of impact assessments. It incorporates the experience gained in over 25 years' use on thousands of projects, ranging from the very smallest to the very largest: models can be of practically unlimited size.

The features, user interface and tools are designed to make it easy to get results without a specialist understanding of noise calculation procedures, and *NoiseMap five* is backwards-compatible so that models developed in earlier versions can take advantage of the latest features.

NoiseMap five provides **all** the functionality of *NoiseMap Server Edition* along with many extra features, including the option to use it in **stand-alone mode** which does not require a specialist database server. Stand-alone mode provides all the modelling features of the database server mode, and can handle large databases for users who do not need distributed calculations or multiple concurrent users. Huge models such as those containing hundreds of kilometres of roads or hundreds of scenarios, and those with intensive calculation needs should continue to use the robust and powerful dedicated database server system.

NoiseMap five integrates *RoadNoise*, *SiteNoise* and *RailNoise* calculations into a single module. The use of 'persistent' properties windows for most types of object lets users with wide screen displays position these at the side of the main graphical window or even on a second display screen. Some property windows are linked: for example, when you select a road segment, the traffic flow window (if open) will automatically show the full properties of the relevant traffic flow.

NoiseMap five also has a more advanced scripting interface that allows many repetitive modelling processes to be automated. When combined with the ability to import and export many model components from spreadsheets, the integration of *NoiseMap* with external data sources is further improved.

UPGRADING FROM NOISEMAP ENTERPRISE EDITION

Existing *NoiseMap Enterprise RoadNoise, RailNoise and SiteNoise* models can be imported into *NoiseMap five*, where they can be combined into a single model, or kept as different scenarios.

Major benefits for *NoiseMap Enterprise* users include far superior import of digital models from shapefiles, DXF files and spreadsheets. Full modelling of buildings and generation of receiver points around buildings are now included; and calculation results, both for individual receivers and noise contours, are stored in the database.

The *NoiseMap Enterprise* concept of separate models files to represent different situations is replaced in *NoiseMap five* by the concept of Scenarios, which represent variations on a base theme. For example, a base scenario could be an existing road network and a second scenario could represent the area with a bypass. Further scenarios could then represent the bypass with a noise barrier, and yet further scenarios could represent different years with different traffic flows. Each scenario can contain any number of road, rail and site noise sources. Noise levels can be calculated for each type of source, and scenarios can be compared to see the difference in noise levels. These tasks are all handled automatically within the software, thereby saving many hours of work.

USING THIS MANUAL AND OBTAINING OTHER HELP

This manual is a comprehensive User Reference Guide to *NoiseMap five* and includes guidance on modelling Road, Rail and Site Noise. Separate 'How to' guides are available to provide step-by-step guidance on particular tasks, including:

- Setting up a *RoadNoise* model
- Using DXF and Shapefiles
- How to create vertical noise contours
- Using category combinations

Where the term *NoiseMap* is used alone, this refers to the latest version, *NoiseMap five*.

Technical reference manuals describe the technical operation of some *NoiseMap* features, including details of calculation procedures, and are available by applying to NoiseMap Ltd.

Context-sensitive help

NoiseMap five contains new context-sensitive help, based on the contents of this manual. Press the F1 key at any time the software is running to obtain context-sensitive help.

This manual

This manual is primarily a reference manual rather than a step-by step guide, although the information has been presented in the order that a user would be likely to require it when starting a scheme from scratch.

This manual covers the various functions of *NoiseMap* in detail, with Chapter 21 showing the menu structure and the primary reference for each menu item. An Index provides a quick way of finding particular descriptions.

We welcome your comments on the content and presentation of this manual.

INTRODUCTION TO NOISEMAP

AUTOMATED MODELLING

NoiseMap automates much of the work involved in creating the noise models from which noise calculations and noise maps are made. It can convert digital maps directly into noise models with little or no user intervention. This includes the conversion of whole topographical models, building layers, road layers etc., into a noise model. This automation helps to reduce the technical complexity of creating noise maps.

It also integrates the modelling of road, rail and site noise sources into a single module.

INTERFACE WITH GIS AND CAD

Digital maps, noise models and noise maps can be transferred between *NoiseMap* and Geographical Information Systems (GIS) using standard digital and graphics file formats such as ShapeFiles, DXF and Bitmap. Noise maps can also be transferred in ESRI Grid format and via text files of x, y, h and dB values.

MODELS OF ANY SIZE AND COMPLEXITY

NoiseMap uses advanced database technology to create noise models and noise maps of any size, from the very simplest to the very largest. It is much easier to track real-world changes to road and rail networks and industrial sites. New proposals and alternatives can be tested without the risk of affecting the base-line model.

COLLABORATIVE WORKING

As noise models get larger, more people will be involved in creating and using them. This will often require collaborative working by teams of people who may be at different locations. *NoiseMap* uses a powerful database storage technology to meet these needs.

SCRIPTING

The scripting interface allows automation of repetitive tasks, including the importing and conversion of shapefiles, traffic flow files and calculation of noise contours.

PRESENTATION-READY MAPPING

NoiseMap contains many mapping features, including the creation of building outlines and other 'feature boundaries' to delineate such things as modelled area, water features, city boundaries and the like. Presentation-ready maps can be produced from *NoiseMap* without the need for a separate graphics package. Noise contours can be exported in a variety of tabular and picture formats for use in reports, GIS systems or other software.

PRESENTATION OVER THE WEB

NoiseMap can create an interactive Web-page version of your model for easy presentation of results. Areas can be selected by tile reference, OS co-ordinates or Post Codes (if the relevant Address-Point data is supplied).

DATABASE TECHNOLOGY

NoiseMap offers a choice of two database technologies:

- a stand-alone or flat-file database suitable for moderate schemes with a limited number of users who may have a standalone PC or network access to an ordinary file server, and
- a powerful remote database system for huge schemes and organisations that work collaboratively and have users needing remote access.

Stand-alone databases

The stand-alone or flat-file database can be kept on your local computer or on a network drive. It uses a database driver built into the *NoiseMap* system. It has the advantage that it does not require a dedicated database server and does not require any special administration. However, it does not control user access, or allow multiple concurrent users or distributed processing via a calculation queue. Nevertheless, it is an attractive option for moderate schemes with a limited number of users.

Remote server

The Remote Server option stores the model in an 'industrial strength' database which will usually be remote from the user's workstation. The database 'engine' may be located on a network, on an intranet or on the Internet. A comprehensive set of database administration tools allows an ordinary *NoiseMap* user to set up new databases and users. This database

administrator controls access to the database by granting users permission to log on to particular databases.

Users can be granted different levels of access to model databases, so that some may be able to create noise models, whilst others may only be able to view existing noise maps.

'Client' computers (ie the ordinary user's computers) can share the processing load when huge models are being calculated. This is known as 'distributed processing', which can greatly enhance the available computing power without requiring expensive multi-processor or ultra-fast machines.

MAINTAINS COMPATIBILITY

NoiseMap is compatible with all earlier editions of our *Noise* software: *RoadNoise*, *RailNoise* and *SiteNoise,* DOS, *98, 2000 Enterprise and Server* editions. You can upload archives from these earlier versions into *NoiseMap* and you can save *NoiseMap* models back into some earlier archive formats, although obviously you may lose certain advanced information when you do so.

ACCURACY

NoiseMap uses the native algorithms as set out in the standards with which it complies. Their operation been verified by hundreds of users and NoiseMap Ltd investigates any issues that are brought to our attention. We run test problems whenever the software is updated to check that consistent results are obtained.

It is also important that users can create error-free models easily. *NoiseMap* has a number of tools to assist in this, including

- View-as-colour (thematic viewing)
- Flexible labelling of the model
- Cross-sections and long-sections (with noise levels)
- 3-d viewing (with noise levels and contours)
- Viewing source contributions
- Checking for duplicated objects
- Calculation log files

These are described in Chapter 13 of this manual.

FLEXIBLE LICENCES

A range of licences are available for *NoiseMap*. These include 'Permanent' licences, Hire, Pay-As-You-Go and Calculation only. Calculation-only licences allow computers to participate in calculations but not to perform any other functions. This is an economical way of obtaining extra computing power when calculating large areas. For example, general-purpose computers could be used to perform calculations overnight.

A licence may allow you to use all three *NoiseMap* modules (Road, Rail and Site) or it may be limited to one or two modules.

Even if your licence is limited to one or two modules, then you can still load a full model. For example, if you have a *RoadNoise*-only licence, you will be able to load rail tracks and site routes but you will not be able to make any changes to them. This ensures that you always see the full model, even though you cannot change certain parts of it.

You should note that menu options that are not permitted by your licence will be greyed-out and you will not be able to select them. Some menu options would also be greyed-out if you are using an older-format database that cannot support these features. You can check which features your licence permits by selecting Help, About from the menu. Licences can be easily upgraded by downloading a code from NoiseMap's administration database. If you have maintenance, you will also be able to check for and download upgrades from the administration database.

CHANGING FROM *NOISEMAP ENTERPRISE* TO *NOISEMAP FIVE*

DIFFERENCES FROM ENTERPRISE VERSION

A *NoiseMap five* model looks very similar to a *NoiseMap Enterprise* model: the same objects are there – traffic flows, segments, noise barriers, receptor points and so on. The same editing tools for changing model objects are there as well, so all this will be familiar to the Enterprise user. However, the model is stored in quite a different way, using a database, and the new concepts will require some familiarisation. The reason for using a database is to allow for the very large models that can be created using the new automation tools.

DATABASES DEFINED

A database is a special form of computer file which is organised so that information can be found quickly. The database contains indexes of individual items for which you are likely to search, speeding up the process.

The database system used by *NoiseMap* is equipped with a powerful search 'engine' that allows sophisticated searches to be made. Then, only the required results need be sent to the user. This reduces the amount of network traffic by ensuring that irrelevant information is not sent over the network.

DATABASE SIMPLICITY

The database helps you to manage large or complex models, especially where you need to test many different variations or stages of a scheme, called 'scenarios' in *NoiseMap*. Existing functions have changed as little as possible.

For example, if you are using the stand-alone system, you select the database file and load it in the same way that you would with a Masterfile or Archive file.

Database Previewer

A database previewer shows all the scenarios in the model, and allows you to select the scenario you require. You can divide the noise model into named areas, so you can just load the area of interest from the list of named areas.

You can resume work on a recent scenario, just by selecting it from the 'recently used' list.

Using the remote system is virtually the same: you simply need to select the server first, which is just like selecting the right network drive when downloading an ordinary file, and then select the database you require.

SMALL SCHEMES ALSO BENEFIT

Even in small schemes you will need to do a 'before' and 'after' model for comparison of impacts. It is much easier to create these different models because of the way that *NoiseMap* lets you put in the differences and save as a new scenario. There is no need to worry about which model files contain which differences. The scenario handling facilities look after this automatically.

Automated model creation increases the cost-effectiveness of computerising the smallest models. Improved mapping also benefits the presentation of schemes whatever their size.

AUTOMATIC TRACKING OF SCHEME CHANGES

With *NoiseMap*, it is much easier to track changes to a scheme, because you can save them as different scenarios within one database. Furthermore, *NoiseMap* remembers which tiles were included in each calculation, so that if you make a change to those tiles, the result will be marked as 'invalid'. When you reload the result, either as an individual calculation or a contour, you will be warned and you can choose whether to re-do the affected results.

COMPUTER HARDWARE

NoiseMap is tested to work with Window XP, Vista and 7. In common with other CAD/GIS applications, *NoiseMap*, is very computationally-intensive and is therefore 'processor-bound'. In other words, processor clock rate is the main factor affecting calculation speed. A PC designed for CAD-workstation use would be ideal and we recommend that you should acquire the fastest PC available at reasonable cost. The RAM should also be as fast as possible.

A base specification would use a 3 GHz Intel Pentium 4 or equivalent processor with 800 MHz front-side bus and 2 GByte of RAM (with Microsoft XP). *NoiseMap* is a single-threaded application but you can purchase multiple-instance licences which will take advantage of multi-core processors.

The 3-d viewer is both processor and RAM-intensive if you are viewing large models. You need a good graphics card which supports the Open GL standard. Most cards do so, although on-board graphics chips are occasionally troublesome, especially as they rarely have any RAM of their own, and have to share main RAM for the 3-d image.

A large display (21 inches or more) is advantageous and you might wish to consider a second monitor for viewing the object properties windows, as some of them are 'persistent' – you can keep several of them open all the time, for example to see the linkages between *SiteNoise* workings, activities and plant at the same time.

A USB or parallel port is needed to connect the security dongle (described in more detail later). You will need a network connection if you are connecting to a remote machine or some means of making back-ups if you have the database in the same machine as the client software.

INTERNET CONNECTIONS ARE NOT ESSENTIAL

You do not require any connection to other computers if you use the stand-alone database system, although you may wish to have an ordinary network connection to a file server to provide a centralised file storage system.

However, if you wish to collaborate interactively with other users, you will probably wish to use a remote database server. Large organisations usually have a wide-area computer network which would provide access to remote servers without using the public internet, but of course, you can only share the database with other people who have access to the network.

If you want to collaborate with people at many locations, then an Internet connection could be much more economical than a wide-area network. Always-on (broadband) connections are now the norm.

If you have huge models, you will need to use the specialist database server, but this can be located anywhere that you can connect to – in your own PC, on an ordinary network or at a commercial server farm.

INTERNET SECURITY

Whilst no public communication system is immune from attack, we use password protection for information sent across the Internet. We also back up the databases so that if they are corrupted by a malicious attack, the loss of data is minimised.

Transaction logs are also kept in event that the communication system fails during a database operation. This helps to recover any operations that did not complete because of the failure.

SSH

For additional security, *NoiseMap* can use communication encryption known as SSH. This will work for any database server that has this option installed. When you set up a server connection from the *NoiseMap* File Menu, you simply need to select the SSH option.

INSTALLATION

NoiseMap is usually supplied by internet download but can be requested on a self-installing CD-ROM. If you are using the Remote Server Option, when you have installed the software you will need to ensure that you can connect to the database, through your network firewall where applicable. See *Setting up a connection to a remote database server,* page 18:1.

DONGLES

You will be supplied with a hardware security key or dongle, which will either plug into your computer's parallel printer port or a USB port, depending on what you have ordered. The security dongle must be in place during the operation of the software: if it is removed, then the software will close down. Your user licence may be 'Permanent', 'Pay-As-You-Go' (PAYG), or 'Calculation only'. PAYG dongles need to be kept topped-up with user time, as described in the separate PAYG manual. Calculation-only licences only permit a limited range of functions, as described on page 14:4.

When using a Pay-As-You-Go dongle, you must use the time-codes in the same order that you download them: this is important if you choose to get several codes at once.

LICENCE SCOPE

Your licence may cover the full *NoiseMap* System, or it may be limited to one or two modules.

If your licence is limited to one or two modules, then you will be able to load a full model but you will only be able to edit and save those parts of the model covered by your licence. For example, if you have a *RoadNoise*-only licence, you will be able to load rail tracks and site routes (if these have been created by someone with a licence that covers *RailNoise* or *SiteNoise*), but you will not be able to make any changes to them. This ensures that you always see the full model, even though you cannot change certain parts of it.

Also, to calculate for *RailNoise* tracks or *SiteNoise* routes and workings (either with a full or a calculation-only licence) your licence must cover these elements.

THE DATABASE

NoiseMap can connect to any number of databases. You will need to know the location of the server on your computer network or Internet, and the name of the database in order to connect to it.

If you are using the remote database server, you will also need to have a user name and password and appropriate 'permissions' in order to connect to the database, to modify it, or to be allowed to make calculations. User access and the level of permission is set by your *NoiseMap* Database Administrator who you should contact in event of difficulties in connecting to the database.

Single stand-alone databases do not require any user name or password.

REMOTE DATABASE

If the database is on a remote computer, you will require a live network or internet link whilst using it. NoiseMap Ltd runs a suitable Internet server to which you can subscribe on payment of a fee, or you can purchase the server software from NoiseMap Ltd and provide your own server hardware. If you are running your own server, you will need someone to act as database administrator. The main duties of the administrator are described in an appendix to this manual.

STAND-ALONE DATABASE

The stand-alone database is an ordinary network file that can be on your own PC or on any network drive. It does not contain any user management capability and security is dependent on your own network security policies. The stand-alone database system does not have any calculation queue facilities or multiple user access capability.

MAP TILES

The database stores the model and noise maps in a series of square 'tiles'. Each tile is 500 m square and corresponds to a UK Ordnance Survey 'Landline' tile, aligned to the National Grid. It is possible to use a different tile size when the database is first set up (on the remote server only). Each tile has a unique reference number in the database (not the same as the OS system) but it can also be given a 'user-friendly' name as well. In other countries, any square grid system can be used.

Note: *it is possible to stipulate a different tile size when creating a new 'remote' database, but this is not generally necessary or recommended.*

Familiar names

It is also possible to give a 'familiar' name to any area of the map covering any number of tiles, for example, 'Southampton', 'Hampshire', 'England'. These areas can overlap and are just a quick way to reference a set of tiles.

Scenarios

You may wish to model many different situations, for example a base case and different junction designs for a road scheme, or different stages of work on a construction site. *NoiseMap* allows a single model to contain any number of these different situations, called Scenarios

DATABASE PREVIEWER

The database previewer is the hub of *NoiseMap* that allows you to manage noise models of any complexity. It lets you name map areas and load noise models in the area of interest. It shows all the scenarios in the database and how they are related and allows you to name or rename them. It also lets you see which tiles are affected by the various scenarios.

Editing

Once you have downloaded the area, you can add, modify or delete objects. The principal way of creating a noise model is to import digital maps or engineering drawings in GIS Shapefile or DXF format, and then to convert individual objects or complete GIS or DXF layers into NoiseMap objects. You can also create objects by tracing over pictures or bit-maps, or simply by drawing on-screen. The techniques are fully described in this manual.

When you have finished editing the model, you can save it back to the database, either as a change to the existing scenario, or as a new scenario.

Creating new scenarios

When you create a new scenario, this will be based on an existing 'parent' scenario. Should any noise calculations require data from surrounding tiles, the information will be taken from the existing 'parent' model, unless and until you change it. This means that you only need to change the relevant parts of a tile to test the wider effects of a change.

These 'rules of inheritance' are explained in more detail elsewhere.

DATABASE SERVER MACHINE

NoiseMap will work perfectly well with the database hosted on your user machine, especially if your models are not too huge and you will be the only one working on it. This is equally true of the stand-alone or remote server options.

However, you should bear in mind that searching a large database does require a fair bit of processing power, and so you may get lower performance if your computer is split between searching the database and loading the model.

It is usually more difficult to arrange collaborative working if the database is on a user machine, since it will need to be left on so that other users can log into it remotely, and other users will

drain some of its resources. For these reasons, it is usually preferable to host large databases on a central server. It is not essential for this machine to be dedicated to *NoiseMap* only.

DATABASE ADMINISTRATION

A remote database will require someone to perform administrative duties, particularly to add new users and databases, to control access and to make backups. These functions are simplified by using the Database Administration Tool which is supplied with *NoiseMap*. For further information, see Chapter18 on Database Setup and Administration, p18:1.

3. NOISEMAP MODELS

INTRODUCTION

A *NoiseMap* noise model supplies all the data that *NoiseMap* requires to undertake noise predictions.

At its simplest level, the noise model can be regarded as a special form of digital map. The *NoiseMap* model must describe:

- Noise sources, such as roads, vehicles, plant, railway tracks
- Transmission path, particularly noise barriers, ground topography and hard or soft ground cover
- Receiver locations

The user does not need to know in detail how these affect the generation and spread of noise. For example, a barrier may screen part of a road from some receivers, but other receivers may not have any screening. The user does not need to consider this detail. You only have to make sure that you put into the model the various objects which affect the spread of noise, and *NoiseMap* will work out how these affect the noise level at any point of interest.

The noise model resembles the three-dimensional physical situation, but only includes the features that affect the spread of noise. These only need to be shown to a level of detail and accuracy that will give acceptable noise calculations.

When you create a noise model, generally you will need to do the following:

- Set up a database to hold the model and all the results;
- Create a list of noise source information, such as traffic flows, construction plant and railway vehicles, to be used in the model;
- Create a ground model, which gives the topography (ground contours) of the study area; you may also need to enter hard/soft ground information;
- Enter information on building locations;
- Enter information on noise barrier locations;
- Enter information on noise source locations, ie roads, site working locations, railway tracks;

- Put noise sources into correct noise source locations
- Enter noise receiver positions.

You may also need to set up noise source categories and various other calculation parameters before starting any calculation work.

Noise sources and locations are modelled slightly differently depending on whether it is a road, site workings or a railway that you are modelling, and these are described later in this section. Detailed information on modelling each of these types of source is given in separate chapters later in this manual.

Digital mapping

The advent of digital mapping has changed the way that noise models are created. In the past, users would have digitised a paper map by manually tracing objects using an electronic drawing board (digitising tablet). The time needed to do this, coupled with the relatively low speed of computers meant that it was important to be selective over the detail put into noise models.

NoiseMap makes it possible to create noise models directly from digital mapping, using automated conversion features in the software. The conversion process strips out unnecessary features and detail from the digital map, whilst adding other essential information that would not be present in the map. For example, a digital map is often only two-dimensional. *NoiseMap* can import ground contour details and use these to add a height dimension to other objects such as roads or noise barriers. Digital maps do not contain information on traffic flows, rail roughness or road surface texture, but *NoiseMap* helps you to add this information to the noise model.

However, a digital map is likely to contain irrelevant detail such as individual trees and low walls, or information that cannot be readily used such as various ground detail.

It will depend on the project whether detail should be processed and added to base mapping in an external GIS or drawing system, or whether it should be done in *NoiseMap*. *NoiseMap* is a specialised GIS and has many features of a drawing system, but it does not replace general-purpose packages.

Information required in a noise model

The full and complete information ideally needed for a noise model is set out in Chapter 20, which also defines the contents of the Shapefiles used by *NoiseMap* to export its noise models. Shapefiles are a method of data transfer used by ESRI GIS systems.

Shapefiles in this format can be immediately imported into *NoiseMap* and automatically converted into a noise model.

Shapefiles in other formats can also be imported and automatically converted, although they may not contain all the information needed for a complete noise model. The additional information must then be imported from other sources, generated with the use of tools within *NoiseMap*, or added manually.

Other digital maps such as those in DXF (AutoCAD data exchange format) can be used, but these are more limited than shapefiles and some post-processing within *NoiseMap* is likely to be needed.

Creating a noise map can require a large amount of data to be assembled in a suitable format. This step is vitally important to the efficient creation of noise models, particularly complex models covering large areas. We would strongly recommend that you read the relevant 'How to ...' guides. You may also wish to consider the capabilities of the scripting interface to automate repetitive tasks.

HEIGHT INFORMATION

The height dimension is particularly important when modelling the spread of noise, but height information is often missing from maps and drawings, whether in paper or digital format.

However, digital height data is now becoming available at reasonable cost through the use of large-area 'remote surveying' techniques, which has greatly simplified this aspect of noise modelling.

NoiseMap contains a number of tools for adding separately-obtained height information to two-dimensional maps, for example by 'draping' them over a grid (or array) of height values (ground levels).

The options for obtaining height information are discussed more fully in Chapter 4 Creating Noise Models.

STRUCTURE OF A ROADNOISE MODEL

The foundation of a *RoadNoise* model is a geographical model of the area where the activities will occur. This is usually created from a digital map, which may be taken from Ordnance Survey digital mapping, an AutoCAD drawing or digitised by hand from a 'bitmap' picture of the area of interest. The bitmap picture can be created by scanning paper maps.

The geographical model should include ground contours, buildings, noise barriers, receiver locations etc. This step is the same for all noise models, whatever the noise source. The main steps in creating a *RoadNoise* Model are:

Traffic flows

Create a table of traffic flows so that you can put a flow on every segment of road in the model. You do not need to have a separate entry in the table for each segment in the model – if the same flow continues along many segments of road, you would

only need one flow value and you can assign the same flow value to each segment.

You can create the table of traffic flows in many ways, for example you can create it in a spreadsheet and then import the values into *NoiseMap*. You can enter traffic flows for a single day, the 18-hour day, day/evening/night periods or for individual hours. See the Index for guidance on the options.

Road segments

The road segments identify the location of the road you wish to model. Each segment is straight and of constant width. It need not be level, but it must have a constant slope. The road segment also has a surface texture and other characteristics which are defined in the road segment properties box.

Assign traffic flows to segments

You do not enter the traffic flows directly into the road segments. You give each segment a flow reference number that corresponds to a particular line in the traffic flow table. This means that you can assess a different traffic flow scenario simply by changing the traffic flow table.

Undertake calculations

You can now calculate the noise level at individual receivers or you can calculate noise contours over an area. *NoiseMap* offers you many different calculation methods and noise indexes.

STRUCTURE OF A SITENOISE MODEL

The foundation of a *SiteNoise* model is a geographical model of the area where the activities will occur. This is usually created from a digital map of the area, which may be taken from Ordnance Survey digital mapping, an AutoCAD drawing or digitised by hand from a 'bitmap' picture of the area of interest. The bitmap picture can be created by scanning paper maps.

The geographical model should include ground contours, buildings, noise barriers, etc. If you have already created a geographical model, perhaps for a city noise map or for a road scheme, then you can just add the *SiteNoise* sources directly to this existing model.

There are four main steps in adding the *SiteNoise* sources to a geographical model:

Plant list

Create a table of information on the noise characteristics of each item of plant to be used in the model. This might be taken from a table of noise data such as in BS5228, or from manufacturer's data or obtained by measurement.

Working locations

Add locations into the geographical model to show where plant could be working. These could be fixed points or routes that

moving plant will follow. You can add these from digital mapping or by tracing over a bitmap with the mouse.

Activities

Create the activities which will generate the noise. For this, you will need to discuss with the site engineers to ascertain what activities will take place on the site.

Position the activities

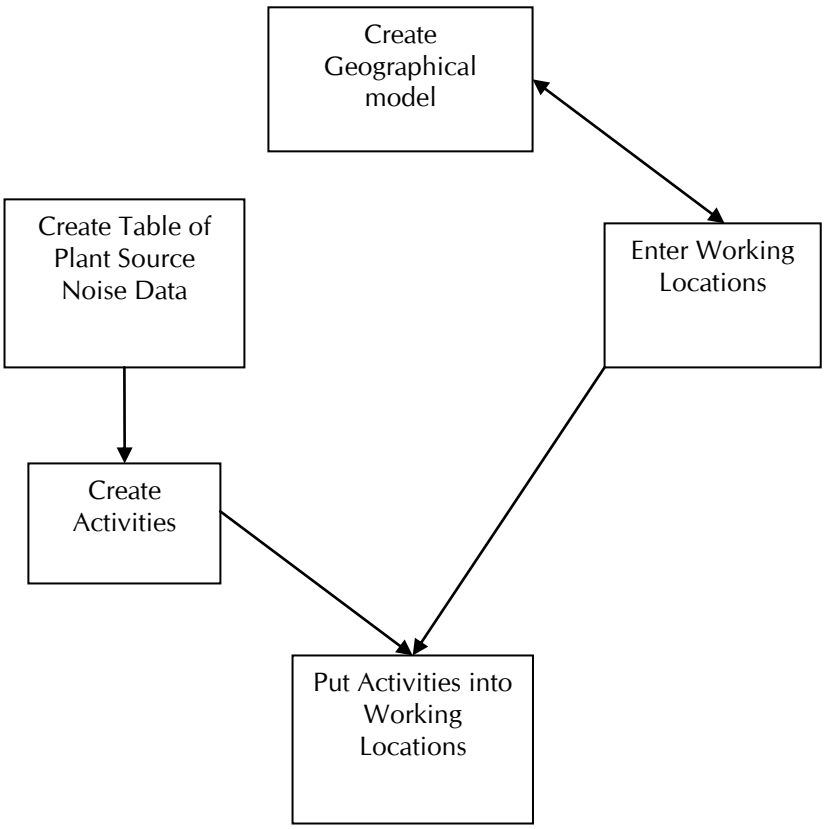
Put the activities into the appropriate working locations. These might be different at the various stages of working a site, and you can create different scenarios to represent each of these stages, based on a general map of the site. **It is those activities that you have positioned at the working locations that create the noise.**

SEQUENCE OF MODELLING

The sequence of the various steps is shown in the diagram below.

You can add the working locations at the same time as you are creating the rest of the geographical model.

You will need to create the table of Plant Source Noise data first, so that you can use it to create activities, but you can create activities before or after you have added the working locations.



Sequence of creating a SiteNoise model

POSITIONING ACTIVITIES AT WORKING LOCATIONS

The last step in creating a *SiteNoise* model is to put activities into the working locations. You need to create both the activities and the working locations before you can do this.

To put an activity into a working location, select the location by clicking it with the mouse. You can choose a chain of working locations by selecting one object in the chain and then using **Ctrl+R** to select the whole chain.

Then open the **Object Properties** dialogue by double-clicking on the working location or by selecting the editing button from the toolbar. In the **Working Activities** section of the object properties dialogue, double-click on the box marked **Select Activity to insert**. The drop-down will show all the available activities. (Note that 'mobile' activities will not be shown for fixed workings, and 'stationary' activities will not be shown for mobile workings.)

Select the activity you require and it will be added to the working location. You can repeat to add as many activities as you require to the selected locations.

Activity location properties

When you first create an activity, you set up default (initial) values for the plant. These include:

- **Category:** This is a way of getting the separate noise contributions of various items of plant or activities, and is explained in detail later.
- **% on-time:** This is the proportion of the assessment period that this item of plant will be operating.
- **Speed:** This is the speed at which the item of plant moves in km/h. *(only used if it is on a haul route)*
- **Flow:** This is the number of times per hour that this item of plant passes along a haul route. *(only used if it is on a haul route).*

You can override these default values when you put the activity onto a working location. In fact, you can use different values for the above items at each working location, and they can be different in each scenario.

You can override either the values for the whole activity, or you can override the values for each individual item of plant.

ACTIVITIES EXPLAINED

Activities are at the core of *SiteNoise*. They tell the model which items of plant are used at which locations in the model. **It is the activities located at working locations that make the noise.**

Examples of activities on a construction site might be:

- Top soil removal
- Excavating sub-soil
- Digging drainage channels

Examples of activities on an industrial site might be:

- Main ventilation fan
- Cyclone fan
- Compressors
- Delivery vehicles arriving

Examples of activities on a petrochemical site might be:

- Oil pump for separators
- Oil pump for storage tank
- Gas valve from separators
- Pipeline to flare

It is clear that for the industrial and petrochemical sites, many of the activities are fixed, although they could be point or line sources, whilst for the construction site, many of the activities are mobile.

SiteNoise contains the tools needed to model each of these.

Multiple plant

In *SiteNoise*, each activity can use any number of items of plant.

For example, excavating subsoil might involve the use of an excavator to dig up the soil, and a dump truck to take the soil away. So you might have two items of plant involved in this one activity.

Multiple locations

The same activity might take place at many different locations. You only need to create the activity once and then you can place it at any number of different locations.

An activity does not generate any noise until it has been placed at a working location.

SCENARIOS

Most noise studies involve the comparison of different situations (called Scenarios in *NoiseMap*). For example, you may wish to compare different stages in the construction of a road. *NoiseMap* lets you create any number of scenarios, which 'inherit' their initial properties from a base scenario.

The same plant and activity list is available in all scenarios, but the activities can be in different locations (or not used at all) in each scenario.

ASSESSMENT PERIOD

The Equivalent Continuous Sound Level (L_{Aeq}) index used by *SiteNoise* is the average noise level over a definite period of time. However, in *SiteNoise*, you do not set the assessment time as an explicit parameter.

Percentage on-time

Instead, you choose the amount of the assessment period that an activity takes place and then set the **Percentage On Time** accordingly.

For example, suppose that you have a 12-hour assessment period, say from 7 am to 7 pm, but a particular activity **A** will only be taking place from 8 am to 12 noon (4 hours) during the assessment period. You would set the activity with a Percentage On-time of (4/12) * 100 % = 33.3 %.

Suppose another activity **B** starts at 12 noon and continues to 10 pm. Since the assessment period finishes at 7 pm, the activity takes place for 7 hours of the assessment period, so you set the percentage on-time to (7/12) * 100 % = 58.3 %.

Note that if you change the assessment period, you will need to modify the percentage on-time appropriately. Thus, if the assessment period is changed to 8 am to 6 pm (10 hours), then Activity **A** will take place for 4/10 *100 = 40 % of the time, but Activity **B** will take place for 6/10 * 100 = 60 % of the time.

Flow rate

For haul routes, the flow rate is in movements per hour. This should be the average flow rate over the assessment period.

However, if you know that a particular activity requires 2 vehicles per hour, but only taking place over half of the assessment period, you will get the same result by giving a flow rate of 2 vehicles per hour with a 50 % on-time, or 1 vehicle per hour with 100 % on-time.

STRUCTURE OF A RAILNOISE MODEL

The foundation of a *RailNoise* model is a geographical model of the area where the services will occur. This is usually created from a digital map of the area, which may be taken from Ordnance Survey digital mapping, an AutoCAD drawing or digitised by hand from a 'bitmap' picture of the area of interest. The bitmap picture can be created by scanning paper maps.

The geographical model should include ground contours, buildings, noise barriers, etc. If you have already created a geographical model, perhaps for a city noise map or for a road scheme, then you can just add the *RailNoise* sources directly to this existing model. A single *NoiseMap* model can contain road, rail and site noise sources. You choose which type of source to calculate when you do the noise calculation.

CREATING A RAILNOISE MODEL

There are four main steps in adding the *RailNoise* sources to a geographical model:

Train vehicle list

Create a table of information on the noise characteristics of each railway train vehicle to be used in the model. This might be taken from a table of noise data such as in 'Calculation of Railway Noise', or from manufacturer's data or obtained by measurement.

Railway tracks

Add the location of railway tracks into the geographical model to show where train services could run. You can add these from digital mapping or by tracing over a bitmap with the mouse.

Train services

Create the train services which will generate the noise. For this, you will need to discuss with the railway engineers to ascertain what train services will use the railway.

Position the train services

Put the train services onto the appropriate tracks. **You must put train services onto the appropriate tracks before you can calculate the amount of noise they create.**

Scenarios

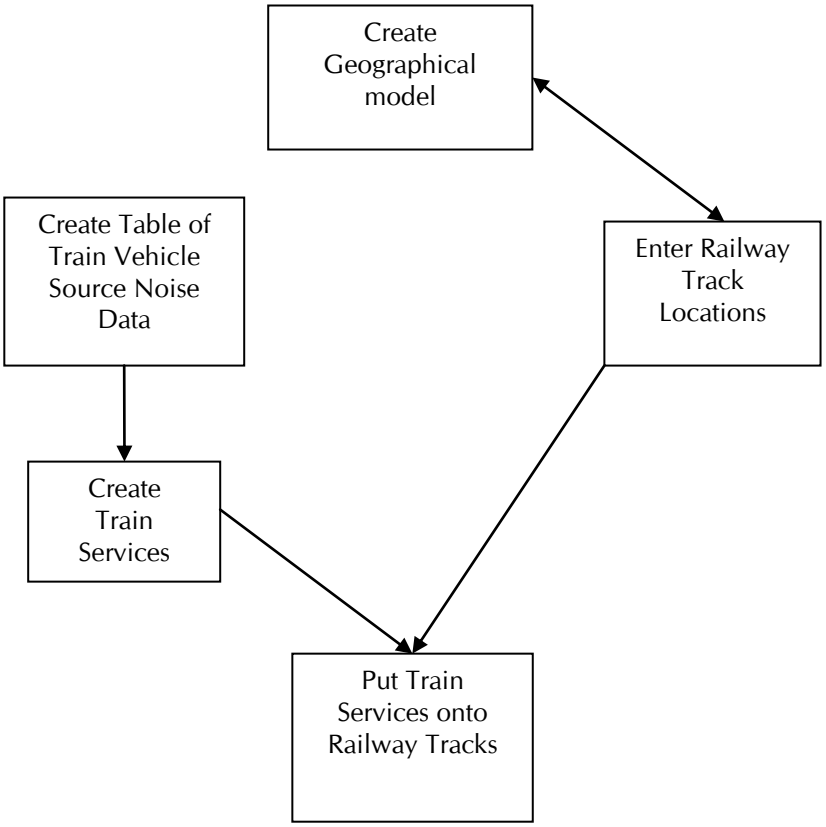
You can create different scenarios to represent various stages in the development of the railway.

SEQUENCE OF MODELLING

The sequence of the various steps is shown in the diagram below.

You can add the tracks at the same time as you are creating the rest of the geographical model.

You will need to create the table of Train Vehicle Source Noise data before creating the train services, so that you can use the appropriate train vehicles when creating services. However, you can create train services before or after you have added the tracks.



Sequence of creating a Railnoise model

POSITIONING SERVICES ONTO TRACKS

The last step in creating a RailNoise model is to put train services onto the segments of track. You need to create both the train services and the segments of track before you can do this.

To put a service into a segment of track, select the track by clicking it with the mouse. You can choose a chain of segments of track by selecting one object in the chain and then using **Ctrl+R** to select the whole chain.

Then open the **Object Properties** dialogue by clicking the **Edit current selection** button on the toolbar. In the **Track Services** section of the object properties dialogue, double-click on the box marked **Select Service to insert**. The drop-down will show all the available services. Select the service you require and it will be added to the selected segment or segments of track. You can repeat to add as many services as you require to the selected locations. *[Note: each service can only be added once to each segment.]*

TRAIN SERVICES EXPLAINED

Train services are at the core of *RailNoise*. They tell the model which railway vehicles are used at which locations in the model.

It is the train services running on segment of tracks that make the noise.

Multiple train vehicles

In *RailNoise*, each service can be made up from any number of train vehicles, of the same type or of different types.

For example, a service may consist of two diesel locomotives hauling a train of 10 carriages of one type and three carriages of a different type. So you might have a total of 15 train vehicles of three different types involved in this one service.

Multiple locations

The train service would run along many segments of track. You only need to set up the details of the service once and then you can position it along any number of different locations.

A train service does not generate any noise until it has been positioned on one or more segments of track.

Service location properties

Certain aspects of train operation can vary along the length of the track. For example, the speed of the train will vary, and for diesel locomotives, they may run at full power only on certain sections of track. Also, the flow rate of a service may vary: for example, there may be a lower train frequency at the rural extremities of a service than in urban areas.

When you first create a service, you set up default (initial) values for these location-dependent train operating parameters. The default initial values include:

- **Category:** This is a way of getting the separate noise contributions of various rail vehicles or train services, and is explained in detail later.
- **Speed:** This is the speed at which train moves in km/h.
- **Flow:** This is the number of times that this train passes along this part of the track during the assessment period (see below).
- **Power:** This applies only to diesel locomotives and lets you set whether the loco is on power or off power by default.

You can override these default values when you put the service onto a segment of track. In fact, you can use different values for the above items on each segment of track, and they can be different in each scenario.

SCENARIOS

Most noise studies involve the comparison of different situations (called Scenarios in *NoiseMap*). For example, you may wish to assess the effect of adding a new train service. *NoiseMap* Server Edition lets you create any number of scenarios, which 'inherit' their initial properties from a base scenario.

The same train vehicle and train service list is available in all scenarios, but you can change the train services that run on each track (or not used at all) in each scenario.

ASSESSMENT PERIOD

The Equivalent Continuous Sound Level (L_{Aeq}) index used by *RailNoise* is the average noise level over a definite period of time. In *RailNoise*, you set the assessment time as an explicit value in the **`Calculation Parameters`**. [This is different from *SiteNoise*, where the assessment period is not set explicitly, but is controlled by the percentage on time in relation to an assumed assessment period. For this reason, there is no Percentage on-time parameter in *RailNoise*.]

Flow rate

For train services, the flow rate is in movements per assessment period. For example, if you choose a 12-hour assessment period, then the flow rate is the total number of trains over the 12-hour period, **not** the average hourly flow rate over the assessment period.

This is because it is usually easier to obtain the total train flow over the assessment period, since the train frequency might vary throughout the operational period. This is similar to the way that road traffic flows are dealt with.

4. CREATING NOISE MODELS

STARTING THE SOFTWARE

NoiseMap uses noise models that are stored in a database. When you start the software, initially the screen is blank. The first step is to connect to the database or database server that manages the database you wish to use. You will require a login name and password to connect to a remote database server, but you only need ordinary file permissions to connect to a stand-alone database.

When you connect to a remote server, you will see a dialogue box that lists all the databases which you can access and you should select the appropriate one. If you cannot see the database you require, or your access is limited to 'read-only' and you wish to make changes or to undertake any calculations, your database administrator will need to change your database permissions.

Further details are given in the section *Connecting to Database* below. The secure SSH method of connection to NoiseMap Ltd's own *NoiseMap* database server is described on page 2:9.

NEW SCHEMES – SCENARIOS AND DATABASES

The database server can hold a large number of different databases. Each database can be thought of as a 'scheme' in the sense of the classic *NoiseMap* Enterprise file system, although one database can contain any number of scenarios relating to that scheme, such as 'before', 'after' and any number of alternatives.

If you wish to start a completely new project, you may wish to create a new database to keep this project separate from others. This makes it easier to archive projects that you have finished. Alternatively, you may wish to create the project as a new scenario within an existing database.

CREATING A NEW DATABASE

You can create a new stand-alone database from within *NoiseMap*, by choosing the **`File`**, **`New database file`** option.

To create a new database on a remote server you must use the separate Database Administrator tool, see Database Administration, page 18:2.

You can add as many new scenarios to an existing database as you wish from within *NoiseMap*. Whenever you create a new

scenario, this will inherit the characteristics of its parent scenario. The first scenario that you create in a database is called the Base Scenario and it will be empty when you first create it. If you wish to avoid the need to create new databases, you can keep the base scenario empty, then you can always start a new scenario from this empty base. To do this, when you first enter objects into the model, you save them into a child scenario, rather than the base scenario. This keeps the base scenario empty.

CREATING AND EDITING NOISE MODELS

If you have just created a new database, you will need to populate it with a noise model. The options for doing this are described in the following section 'Options for loading noise modelling data', see page 4:3.

The basic contents of a noise model, and methods of navigating around it and editing it, are described in Chapter 5.

CONNECTING TO DATABASE

The method of connecting to the database depends on whether it is a stand-alone database or a remote database, but once connected, the two systems are used in exactly the same manner.

STAND-ALONE DATABASE

- From the **File** menu, select **Open database file**;
- This will open an ordinary **File Open** dialogue box where you will be able to navigate to the file folder where your database is stored: Select from the list the database file you require and click **OK**.

The connection will be established, but no model data is loaded so the *NoiseMap* screen remains blank at this point, except for a pink strip at one edge to show that the database is connected. You can now load the model data as described below, under 'Options for loading noise modelling data', page 4:3.

REMOTE DATABASE

To connect to a remote database, go to the **File** menu and select **Connect to server.** This will open the dialog:

NoiseMap Remote Server Login

This will open a dialogue box where you will be asked to select the appropriate NoiseMap server: select the one you require from the drop-down list and click **OK**. If your server is not listed, then your computer needs to have a new server connection added as described in the section *Setting up a connection to a remote database server* on page 18:1.

Select the appropriate connection, type in your user name and password and click **OK**. (If you are unsure about these details, contact your database administrator for assistance.)

You can select this as the default server so that you can use the **Establish Default Connection** option next time.

Select database

- If the selected data source has more than one database associated with it, these will be shown. Select the one that you require. This can be set as the default database so that it will be automatically selected next time.
- When the link has been established, a dialogue box will confirm the link and the name of the database. If this is correct, click **Yes** to continue.

Load model

The connection is now established, but no model data is loaded and so the *NoiseMap* screen remains blank at this point, except for a pink strip at one edge to show that the database is connected. You can now load the model data.

OPTIONS FOR LOADING NOISE MODELLING DATA

The main ways of loading noise modelling data are as follows:

- Preview the database, see page 4:4
- Load tiles from the database, see page 4:8
- Import an existing masterfile (in *NoiseMap* traditional format), see page 4:9
- Import an existing archive (in *NoiseMap* archive format) see page 4:10
- Build a new scheme from scratch, see page 4:13
- Load noise contours stored in database, see page 10:7.
- Undertake calculations on the database, see page 10:1.

These options are discussed in detail in the following sections.

RECENT DATABASES

If you have recently been using a database but have not set it as the default, select **File**, **Recent Databases** to select from a list of recently-used databases. You will be offered a dialogue

box with the server, database, scenario and user name already entered. Just enter your user password and click Load.

If you only want to connect to the database without loading it, then Ctrl + Click the Load button.

DATABASE PREVIEWER

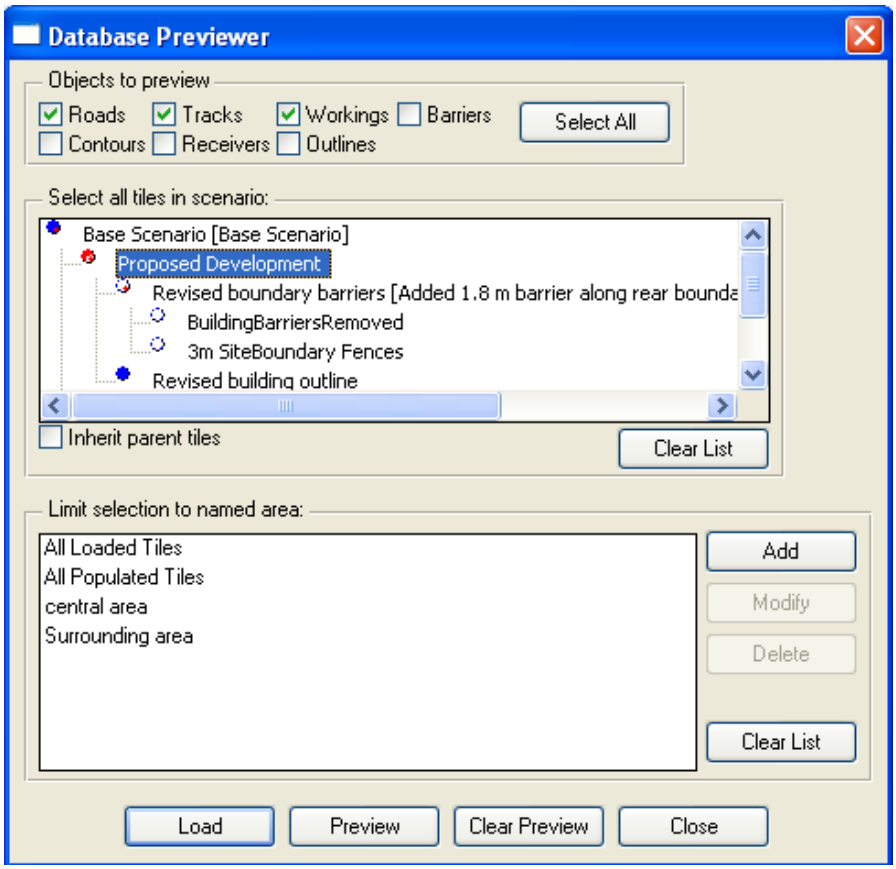
The database previewer provides a visual interface to the database without needing to know any tile numbers or co-ordinates. It shows you

- which scenarios are contained in the database,
- which tiles contain data for each scenario,
- the size and location of a named area.

You also use the previewer to create or modify named areas.

You can download a 'preview' of any tiles that you have selected. You cannot edit or calculate on the preview, but you can see which objects are present in any particular scenario. From the preview screen, you can choose to load the editable model of the selected area, so that you can do full editing and calculation of the model.

You can choose which of the objects contained within the model will be displayed when you load a preview. By default, this is only road segments, railway tracks and site workings. This lets you identify an area whilst keeping display speed fast. You can also choose to include other objects such as Building Outlines.



Database Previewer Dialogue

STARTING THE DATABASE PREVIEWER

Select **`File`**, **`Database previewer`**. The Database previewer opens with a dialogue box containing three sections:

- Objects to be shown in preview
- Scenarios in the selected database
- Named areas

These are described in the following sections.

Objects to preview

The Objects to preview check boxes let you select which objects will be downloaded in preview mode. By default, this is only Road Segments, Railway Tracks and Site Workings, but you may include other objects such as barriers, contours, receivers and building outlines. You should note that in large models, it may take a significant time to download large amounts of detail, such as building outlines, so you may not always want to preview these.

Select all tiles in scenario

The list shows all the scenarios that are in the database. Click on any one of the scenarios to highlight it. *NoiseMap* will colour in purple all the database tiles that contain some objects for the chosen scenario. *Note*: the display does not automatically centre around the area occupied by the chosen tiles: to find the tiles,

you will need to click the mouse on the *NoiseMap* title bar and then use the *Cursor Keys* (not the mouse) to navigate to the area of interest.

Icons

The scenarios are shown in a tree format, with circular icons. These icons can be coloured to signify various conditions:

- **Hollow (empty)** – unpopulated for some or all of the highlighted tiles (coloured purple) on the graphical display
- **Filled red** – contains data for all the highlighted tiles and is the currently selected scenario
- **Filled blue** – contains data for all the highlighted tiles, but is not the currently selected scenario
- **Contains a red arrow** – scenario is a parent of other scenarios

Inherit Parent Tiles

If the **`Inherit parent tiles`** checkbox is clear, then when you select a scenario from the Scenario list, *NoiseMap* will highlight only those tiles where the geographic data is different from the parent scenario. The tiles containing only data inherited from the parent scenario will not be highlighted. When you Load a scenario, only the highlighted tiles will be loaded.

By checking the **`Inherit parent tiles`** checkbox, you can highlight all the tiles containing geographic data for the scenario, including those inherited from parent scenarios.

Limit selection to named area

Clicking on any of the named areas in this list will highlight the tiles corresponding to the named area. The display will automatically zoom to that area.

If no scenario has been selected from the scenario list, the complete named area will be shown. If a scenario is also selected, then the highlighted tiles will be only those in the named area which also apply to the selected scenario (including any parents if the Inherit box is checked).

The named area list also includes two special entries.

- **All populated tiles** – highlights every tile populated in the database
- **All loaded tiles** - restricts the preview to those tiles where you have already downloaded some objects from the database. This is particularly useful if you are using the previewer to compare two scenarios

Add

Add allows you to create a new named area. Select the required tiles in the graphical view and then click 'Add'.

Modify

Modify allows you to change the tiles that are included in a named area.

Delete

Delete removes the selected named area from the database.

Clear list

Clears any selection in the list box or manually selected tiles.

SELECTING TILES IN THE PREVIEWER

To select tiles, you choose a scenario and a named area. The tiles within this scenario and named area will be highlighted in purple. You can then change the selected tiles by using the mouse. There are three methods of selection

- Clicking a tile toggles its selection (it selects a tile that was not selected, and deselects a tile that was selected). You can click and drag to toggle the selection of a number of tiles.
- Shift-click deselects a tile. You can click and drag to deselect a number of tiles.
- Ctrl-click selects a tile. You can click and drag to select a number of tiles.

DOWNLOADING FROM DATABASE

You can download from the database any tiles that are selected in the previewer. You can either download a **Preview**, which is a non-editable skeleton view of the chosen area, or you download the full editable version of the chosen area.

Preview

This button will download a preview (skeleton view) of the selected objects contained within the highlighted (selected) tiles.

If you have selected a scenario from the list, that will be previewed automatically. If not, you will be asked which scenario to load.

Load

This button will download the full model detail for all objects within the selected tiles, *but only those that are visible in the display*. This means that for scenarios that cover very large areas, such as the Base Scenario, you can avoid loading excessively large areas.

If you already have some part of the model loaded, the same scenario will be loaded for your requested area - you cannot *load* two scenarios at once. You can *preview* a different scenario from the one you currently have loaded, which allows you to compare the differences between two scenarios.

If no area is currently loaded, you can select which scenario you want to load from the scenario list.

Clear preview

This removes any currently displayed preview from the screen.

RULES OF INHERITANCE

The rules of inheritance govern the way that information in a 'child' scenario is affected by changes to the 'parent' scenario on which it was originally based. The rules are intended to be 'intuitive', ie to behave in the way you would expect and want them to behave, and generally users should not need to worry about them too much. This section introduces the rules of inheritance, but for more details, see Chapter 9 Scenarios.

You create a new scenario when you save changes to a scenario as a new 'child' rather than to the scenario you are working on. The original scenario becomes the 'parent' of the child. If any noise calculations require data from surrounding tiles which do not have any objects belonging to the scenario, the information will be taken from the parent model. This means that you only have to change the relevant parts of the affected tiles in order to test the effects of a change across a wide area.

If you make a change to objects in the 'parent' scenario, then these will affect any descendants of the parent, unless that object was deleted or altered in the 'child' scenario.

If you create new objects in a 'parent', they will appear in the child. Changes in a child scenario will never affect the parent.

It is not possible to save changes into a new scenario that is independent of any parent.

Some information is not limited to a particular tile or a particular scenario, including calculation control parameters, categories and combinations, site plant and train vehicle definitions, site activity and train service definitions. For these items, the user has some control over the way that information is inherited, see page 9:4 onwards.

LOADING TILES FROM DATABASE

Select **File**, **Load from database**. This will open a dialogue asking you to select the tiles to load.

Named areas

If areas of your database have been given names, you can click on **Show area names** and you will see a list of all the named areas in alphabetical order. Click on the name that you require and click **OK**. The name will be entered into the dialogue box.

Tile names or numbers

If you require an un-named area, type in the familiar name or the database index number of the tiles you require. If you require several tiles, separate each tile number with a comma.

Postcodes

If you have the OS AddressPoint database loaded into your server, you can move directly to that area. For example, to navigate to postcode SE11 4TH, type the following into the dialogue box, observing the correct spacing in the code:

POST:SE11 4TH

Surround margin

To avoid edge effects when doing noise calculations, or simply so that you can see more of the scheme, you may wish to include a number of tiles around the tile of interest. You can do this automatically by entering the required width of the surrounding margin in the box. If you are loading a single tile, a surround margin of 1 will load nine tiles: the centre tile and the eight tiles surrounding it. A surround margin of two will load 25 tiles, and so on.

SELECT SCENARIO

A dialogue will now show you a list of the scenarios that exist for the selected tiles. The coloured icons show which scenarios contain data for the selected tiles, see page 4:5.

If you uncheck the box marked **`Only scenarios which apply to selected tiles`** then all scenarios in the database will be shown.

Scroll to the required scenario. The lower section of the dialogue box gives you further information on the selected scenario. Click **`OK`** to load the scenario.

The information for the selected tiles will now be retrieved from the server. A series of information windows will inform you of progress. When retrieval is complete, the selected area will be displayed on screen.

IMPORT EXISTING NOISEMAP ENTERPRISE MODELS

You can import a *NoiseMap Enterprise* modelwhich has been stored either in Masterfile format or in Archive format. These will be converted into database format and will be merged with any model already in the database. The merging process may require some manual intervention if imported traffic flows, categories and combinations have numbers already used in the database. You may find it useful to check traffic flow numbers, categories and combinations before beginning the merge process so that you can decide what to do if the same numbers are used in both. The following sections describe the process in more detail.

Hint: .MAS files

Microsoft has adopted the file extension .MAS to mean 'Microsoft Access Stored procedure' which is a type of file that can make changes to your computer software. They have therefore prevented .MAS files from being downloaded by Outlook. You can make a Registry change that reverts them to normal treatment, but if you need to email such files, it might be simpler to change the file extension to a different name, and rename once received.

When some objects cross a tile edge, they will be split into two objects and both objects will inherit compatible properties. For example, where a road segment crosses a tile edge, the original traffic flow will be assigned to both of the new segments. Its height at the boundary will be interpolated from the height at the two ends

To import an existing Masterfile, click **`File, Import scheme`**. The file menu will open and you should navigate to the appropriate masterfile and click **`OK`**. The file will be downloaded and in the process each object will be allocated to the appropriate tile. The objects will become part of the current database and current scenario. The original file allocation of the objects is not retained.

IMPORT EXISTING ARCHIVE

INTRODUCTION TO ARCHIVES

An Archive is a compressed noise model file in the form of a computer 'memory map'. An archive stores all the objects and other model information that are downloaded to *NoiseMap* at the time the archive is saved. In **NoiseMap fi✓e**, this does **not** include any noise contour that was on screen or any bitmap that was loaded.

Its primary purpose is to save a snapshot for record and backup purposes. It can also be used to transfer the snapshot to a new database or standalone computer. With some limitations, it can also be used to transfer models to and from other versions of *NoiseMap* and to export a scenario to a new database.

An Archive is not a database, so it must be converted into the appropriate database form when it is loaded. If you are loading an archive into a new database, this is straightforward – the archived information fills in the details in the empty database. However, if you are importing into a database that already contains information, then the new details must be merged into the existing details without causing conflicts. This checking and merging process may require some manual intervention as described below.

There are four types of archive file:

- .nma – *NoiseMap* archive – can store all information from a *NoiseMap* model;

- .rna – *RoadNoise* Archive – can store all information pertinent to roads and can be read into a *RoadNoise* Enterprise model;
- .sna – *SiteNoise* Archive – can store information pertinent to sites and can be read into a *SiteNoise* Enterprise model;
- .tna – *RailNoise* archive – can store information pertinent to rail models and can be read into a *RailNoise* Enterprise model.

Any of the above types of archive can be read into *NoiseMap five*. You should note that some advanced features of site models – such as multiple plant in one activity – are not supported in *SiteNoise* Enterprise, and the same is true of *RailNoise* Enterprise. If you export models that use these advanced features, they will be omitted from .rna, .sna and .tna archives, and only included in .nma archives.

COMMENCE ARCHIVE IMPORT

To import an existing Archive, click **`File, Import archive`**. The file menu will open and you should navigate to the appropriate archive file and click **`OK`**. The file will be downloaded and in the process each object will be allocated to the appropriate tile. The objects will become part of the current database and current scenario. Details of the original file allocation of the objects will be lost.

Where an object crosses a tile edge, it will be split into two objects and both objects will inherit compatible properties. For example, where a road segment crosses a tile edge, the original traffic flow will be assigned to both of the new segments. Similarly, where a ground profile crosses a tile edge, its height at the boundary will be interpolated from the height at the two ends.

MERGING ARCHIVES AND MASTERFILES INTO AN EXISTING MODEL

CONSISTENCY CHECKS

If you are importing into a new database, checks are made for internal consistency. You should always review the Output Screen to check the messages. When you import an archive or masterfile into an existing model, *NoiseMap* will check for clashes with information already present in those tiles. For example, the same traffic flow IDs, category numbers or category combination names might be used in both places.

If the same traffic flow ID is used in both places, they may represent entirely different traffic flows, they may simply duplicate information already present, or they may represent a new scenario for an existing road. NoiseMap provides a method to deal with these potential conflicts.

You should note that the process of merging two models is entirely different from importing traffic flows from a spreadsheet, where you often want the imported traffic flows to replace existing flows. See Importing Traffic Flows for a description of this process.

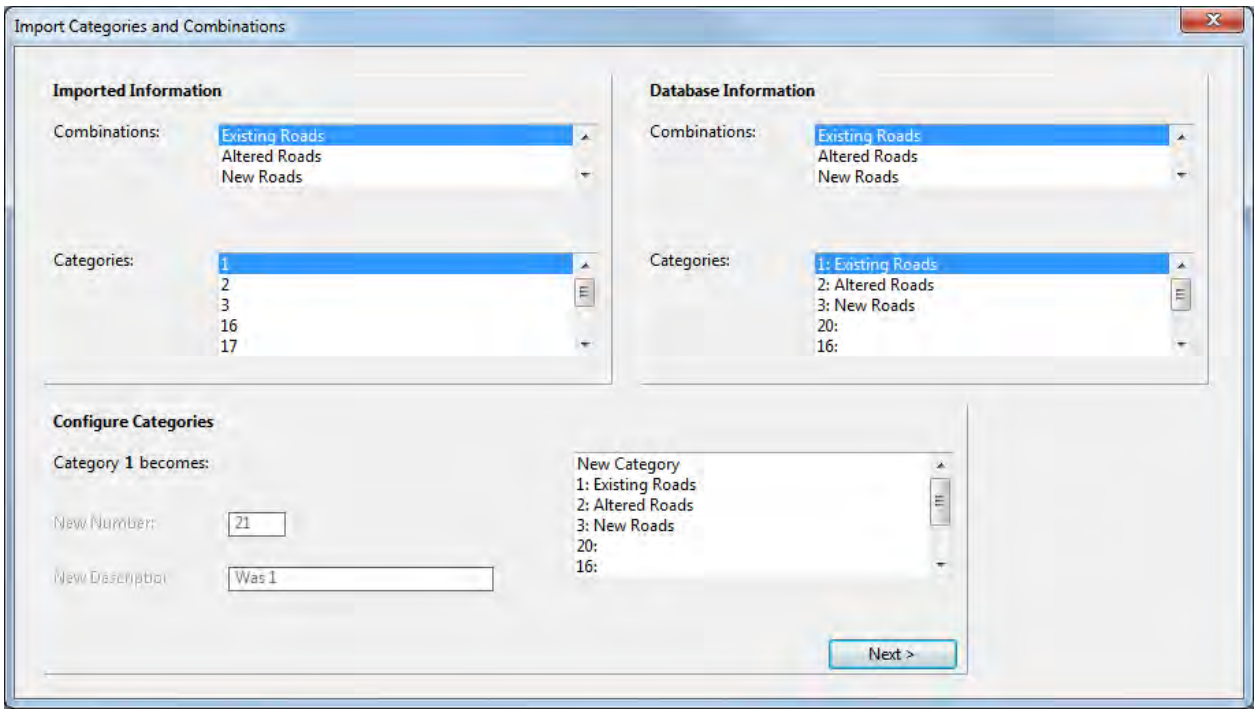
Before importing an archive or masterfile into an existing database, you will find it helpful to check whether the same traffic flow ID numbers are used in both, and if so, which of the above situations applies to each flow. If you want to avoid traffic flow conflicts when merging two models, it may be advisable to delete them from the original file before saving the archive.

You should make corresponding checks on category numbers and category combinations.

NoiseMap also checks to see if any objects exactly duplicate objects already in the model – for example, road segments or building outlines. You should check the Output Window for messages. You can remove the duplicates by selecting **`Calculate> Check Loaded Model`** and select **`All but the oldest duplicate`** and then click **`Delete`**. This will remove all the duplicate instances of the object. For further details, see p 13:12.

MERGING CATEGORIES AND COMBINATIONS

When an archive is imported into an existing database, any categories and combinations in the imported file must be merged with those already in the database. Firstly, the Categories must be set up, and then the Combinations. A dialogue window opens to control this process.



Importing categories and combinations

The upper section of the window on the left shows the Category and Combination information in the imported Masterfile or Archive file. The information already in the model is shown on the upper right. This is for information only and is not used during importation.

You use the **lower** section of the window to configure (allocate) first the imported the categories. In the dialogue shown above, it is asking you deal with Category 1. In the drop-down list at bottom right, you can select one of the existing Categories, or you can select 'New Category' in which case, you can choose a 'New Number' and a New Description (name) for the category.

You must repeat this process for all the Categories in the imported file.

You must now configure the Combinations. The process is similar. You will be asked to allocate each of the combinations in the imported file either to an existing combination, or to create a new combination.

TRAFFIC FLOW ID NUMBERS

Because most models have a large number of traffic flows, it is not desirable to review the assignment of each traffic flow during import. The following procedure is therefore used.

- If the traffic flow number is not already in the **database**, it is imported without change.
- If the traffic flow number is already present in the database, then the flow already in the database is renumbered to the next available **new** number

The output log will record any changes made to the numbering. It is important to check this as it is the only record of the changes that have been made.

NoiseMap assigns unique internal numbers to each flow, so it will still assign the correct flow to the segment, but care in this process will avoid potential confusion if traffic flows need to be edited subsequently.

CREATING AND UPDATING *NOISEMAP* MODELS

Once you have opened the database where your model will reside, you may want to create a new model or make changes to an existing model. You can import Masterfiles from the Enterprise or earlier versions of the software, and you can edit an existing model once you have imported it.

Shapefile

If you are creating a new scenario, you will probably wish to do this from digital maps and other data. Probably the most efficient way is to import mapping and other data in the form of a 'Shapefile', described below. Shapefiles contain not only the 3-

D location of objects, but also other attributes like traffic flows, road surface types, addresses and so on.

DXF

Drawing Exchange format (DXF) is a very common format for digital drawings, originating from AutoCAD. It normally only allows 2-D or 3-D lines to be imported, without the 'attributes' available in a Shapefile. You can import and undertake automatic conversion in both Shapefile and DXF formats.

On-screen drawing

Finally, you can create models by on-screen drawing with the mouse. These will be converted automatically into noise model objects. See *Chapter 5, Navigation and Editing*. You can load a map of the scheme as a bit-map and then trace over it to create the model, see *Working with Bitmaps, p 4:43*

DXF DIGITAL DRAWING FILES

INTRODUCTION

NoiseMap can import digital drawing files in DXF version 12 format. The drawing units must be in metres.

DXF is a drawing exchange format used by many drawing packages, such as AutoCAD. Many digital maps, including UK Ordnance Survey Landline and Landform maps, can be obtained in this format. DXF files contain the 2-D or 3-D co-ordinates of each object in the drawing, so when loaded the drawing will automatically appear at the correct co-ordinates.

Hint: Specifying DXF files for automatic conversion

*For easiest automatic conversion of DXF files, you should request the following specification: * DXF version 12 format; *Drawing units in metres; * Map uses Ordnance Survey National Grid co-ordinates (i.e. objects are at their real world position); * Each layer should only contain one type of object; * Ideally, objects should be 3-dimensional (i.e. with height co-ordinates) though this is not essential; * Objects should be 'exploded' and external references should be resolved.*

Because DXF is a general-purpose format, digital drawings can be constructed in an infinite variety of ways. It is not possible to guarantee that all digital maps can be read correctly by *NoiseMap*. *NoiseMap* does not attempt to provide all the features to be expected in a CAD package. You cannot edit or re-export a DXF drawing, although you can export a *NoiseMap* model as a DXF file.

Quite often, the digital map of a large scheme is subdivided to produce a 'layout' which fits onto conventional paper sizes, often within labelled drawing frames. *NoiseMap* will ignore such layouts. They are not usually very helpful for noise modelling, as the scheme is discontinuous and the separate strips are not in the correct geographical relationship. Instead, the drawing will be

displayed as a map with the various elements in correct geographical relationship.

Layers and automatic conversion

A DXF drawing contains a large number of 'entities' which are grouped into layers. It is preferable that each layer should only contain one type of entity, for example, road centre lines should be in one layer, kerb lines are in another layer and buildings are in another. Labels are also in separate layers. If each layer of the DXF drawing contains only one type of object, this will make it much easier to use the automatic layer conversion system built into *NoiseMap*.

Where DXF drawings contain a mix of different types of object, *NoiseMap* is still able to semi-automatically convert some types of entity into noise model objects. In order for entities to be converted, they must be represented as 'polylines', ie short sections of straight line joined into a continuous chain.

Where DXF drawings use other ways of representing objects, such as arcs and elliptical shapes, instead of polylines, these cannot be automatically converted by *NoiseMap*, but can be entered manually by tracing over them with the mouse.

HEIGHT INFORMATION

The height dimension is particularly important when modelling the spread of noise, but height information is often missing from maps and drawings, whether in paper or digital format.

For example Ordnance Survey 'Landline' and 'Mastermap' drawings are only two-dimensional: all objects are effectively at zero height. Ground contours are not provided: usually the only height information is in the form of spot heights. These are in the form of crosses in one layer of the drawing to mark the location, and an associated height label in another layer of the drawing.

However, digital height data is now becoming available at reasonable cost through the use of large-area 'remote surveying' techniques, which has greatly simplified this aspect of noise modelling.

OS 'Landform' drawings contain three-dimensional ground height information, and are available in two types: one with spot heights and contours, and the other as a rectangular matrix of heights.

Independent providers are now able to supply various types of remotely-surveyed height datasets, which are usually used in conjunction with 2D maps such as OS Landline, MasterMap or specific scheme drawings, which provide the location of built features.

NoiseMap contains a number of tools for adding separately-obtained height information to two-dimensional maps, for

example by 'draping' them over a grid (or array) of height values (ground levels), described in the next section.

Some engineering design packages, such as MX (MOSS) and AutoCAD can produce a full 3D line output and these can be used by *NoiseMap* to produce the 3D model directly.

For more detail on obtaining and processing height information, see our separate 'How to' guide.

AUTOMATIC HEIGHT GENERATION

NoiseMap can generate heights automatically if 3D data is present in the map being processed, or it can extract heights from a separate dataset and add them to the objects being processed.

There are six options for obtaining heights, but you will only be offered those options available from the data present:

- from the DXF line itself (if it is three-dimensional): this is the easiest and most accurate, when the model is in 3D (for example output from a highway design package);
- from OS 'Landform' (or other types) of ground height grid: this is a straightforward and automatic way of adding height data. The edges of features can be blurred by the horizontal grid spacing and a plan map will be needed in order to see the location of features. New digital datasets are available with a close grid spacing that can give good resolution of small features.
- from selected DXF layers: if you have combined an OS 'Landform' ground contour map with the OS 'Landline' map (using another CAD package), you only want to use the 3D ground contours when getting heights: you indicate the available layers in the DXF View Options screen;
- from *NoiseMap* ground contours, perhaps previously obtained by converting OS 'Landform' contour data;
- from *NoiseMap* spot height chain (a chain of points you create temporarily for obtaining heights), see p. 5:15;
- entered manually in the object properties editing screen.

When you are putting in a new object, it may not be at ground level. If you are getting the height from ground contours, then you would need to add some height to the local ground level to obtain the height of the object. For example, if you are entering a barrier which is 3 m above ground level, enter 3 in the **`Add Height`** box.

LOADING A DXF FILE

Before you can load a DXF file, you must have a scheme open, or you must create a new scheme, as described elsewhere in this manual.

To load a digital map, select **View**, **Load DXF File**.

This will open the **Select DXF File** window. Navigate to the file containing the DXF model (NB it must have the file type DXF) and double-click or select **Open**.

NoiseMap will read the file and show the message:

```
Performing DXF pre-scan
```

During this process, it will look for entities in the drawing, and decide which are likely to be features that you would wish to convert into a NoiseMap model. It will make these features selectable with the mouse. Sometimes, there may be several separate large blocks in the drawing. If so, their names will be displayed, and you will be asked which ones are to be imported. The drawing will then be imported and it will appear centred on the screen. The usual navigation controls can be used to pan and zoom around the drawing. If you 'lose' the DXF model, you can re-centre it on the screen by selecting View, Centre View Around DXF.

Layer name	Description	Colour
G8010001	Building outline	Red
G8010004	Building outline (overhead)	Red
G8010014	Railway (narrow gauge)	Blue
G8010015	Railway (standard gauge)	Blue
G8010021	Road (public) edge of metalling	Blue
G8010025	Triangulation point	Blue
G8010026	Bench mark	Blue
G8010027	Spot height	Blue
G8010030	General detail, hedges, fences, walls	White
G8010032	General ground level or minor overhead detail	White
G8010033	Underground alignments, course of antiquities	Blue
G8010059	Water detail	Cyan
G8010098	Centreline public road	Yellow
G8010374	Top of slope	Red
G8010375	Top of cliff	Red
G8010376	Bottom of cliff or slope	Brown
G8010572	Grid lines	White
G8010575	Grid values	White
G8011000	Road names and numbers	Blue
G8011005	Administrative boundary text	Magenta
G8010006	Building names and numbers	Red
G8010009	Miscellaneous text	White
G8011010	Water feature text	Cyan

OS Landline – Layer numbers (Selected)

CONTROLLING THE DETAIL IN THE DXF VIEW

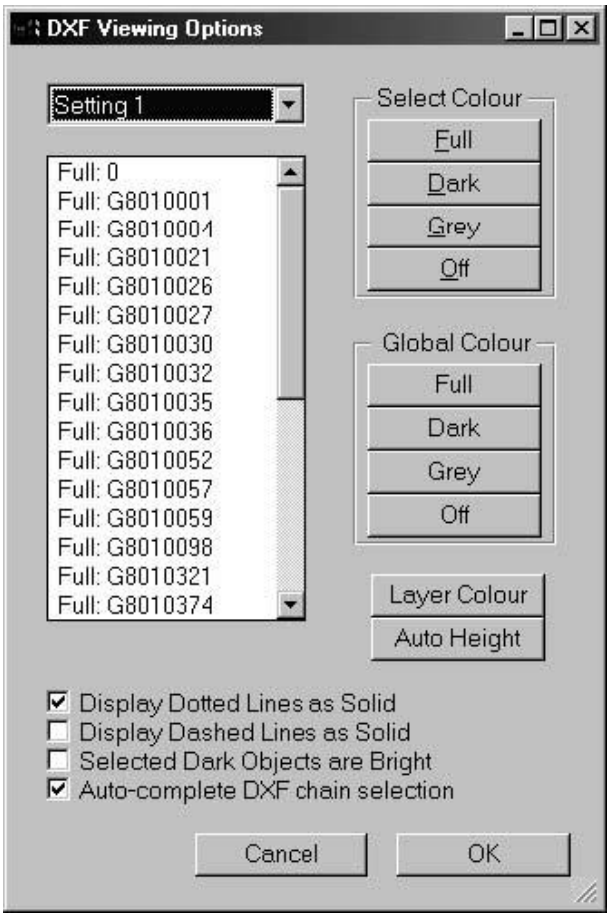
To control the DXF view, select **View**, **DXF Viewing Options**. This lets you control:

- which layers of the drawing are displayed
- their colour and display appearance.

The list at the left-hand side of the box shows all the layers in the drawing. OS maps use a series of codes for this, see table inset. Other drawings may use different layer names. The box is resizable to let you see longer names.

Each layer can be set to show objects in different colours:

- Full colour – objects are shown in the specified colour
- Dark – dull version of full colour
- Grey - the objects are shown in a shade of grey. Greyed objects cannot be selected with the mouse.
- Off - the objects are not shown



DXF Viewing Options

Turning a layer to **Dark** can make a drawing easier to read by fading out unimportant detail. Turning an object to **off** can greatly increase the re-draw speed of large drawings.

You can change the setting by selecting the layer and clicking the **`select colour`** button. You can save up to three settings for future use by clicking on the down arrow and choosing a setting number. However, these settings are not remembered when you exit *NoiseMap*.

Changing layer colours

By default, layers will be shown in the colour defined by the DXF file. You can change the colour of any layer by selecting it and clicking Layer colour. This will show 16 pre-set Windows colours. Choose one of the colours by pointing at it with the mouse and clicking, and close the window by clicking **`OK`**. In addition to the pre-set colours, it is possible to select any other colour available on your graphics card. To do this, click on the pre-set colour you wish to change, then click Edit. A selection of a further 48 pre-set colours is shown. You can select one of these or click on Define Custom Colours. A further screen opens, showing the full palette available. Click at the point which has the desired hue, then move the slider on the right hand side up until the requisite luminance is achieved. Then click Add to Custom Colours. You may then select the colour and click **`OK`**. It will now be added to the colour choice in the layer colour picker display. Select it and click **`OK`** to change the colour of the layer.

Auto height

If you have a 3D ground contour that you wish to be used in generating the height of *NoiseMap* objects, indicate which layers contain the height data by selecting the layer name and clicking **`Auto Height`**. This will put an asterisk alongside the layer name to show that entities in that layer can be used in auto height calculations. Ensure that you do not select 2-D entities, such as grid lines, as they will not have a valid height dimension. *Note that selecting a layer for auto-height calculation does not cause heights to be calculated: you still have to choose to do a height calculation during the DXF conversion process.*

MODEL DISPLAY

Display dotted lines as solid
Display dashed lines as solid

Some lines in a DXF model may be dotted or dashed. This can make them more difficult to see, especially if they are short, and may make it more difficult to tell when they have been selected in *NoiseMap*. Check these boxes to display them as solid lines. *Note that this only affects lines which have been entered as a continuous line with a dotted/dashed display characteristic. It will not join up lines which have been digitised with a break in them.*

Selected Dark Objects are bright

This can make it easier to see when a dark object has been selected.

Auto-complete DXF chain selection

Most entities are made up from several short lines joined in a chain (a polyline in CAD parlance). This option causes the whole chain to be selected when you click on any part of it. This is usually the preferred option.

Hint: Joining DXF chains

A single entity in a DXF model may have been drawn with a number of separate chains (polylines in CAD parlance). These chains often break across adjacent map 'tiles'. or for other reasons. You can join two adjacent chains into a continuous chain by selecting them and clicking ***Edit***, ***Join DXF chains***. *This lets you auto-convert longer lengths of objects.*

CONVERT DXF SELECTION

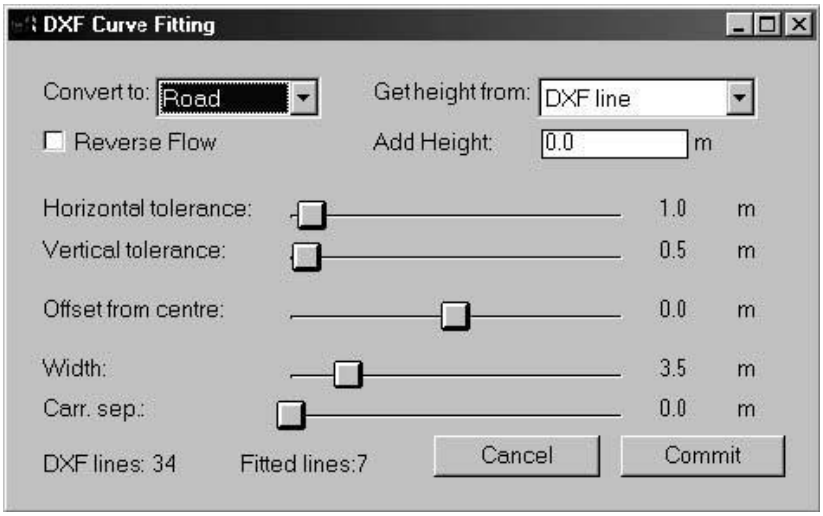
If your DXF file contains only one type of object in each layer (e.g. one layer may contain roads only, another may contain buildings only, and so on) then you may be able to convert all the objects in the layer into *NoiseMap* objects in one operation. In this case, see *Automated Model Creation*, page 4:26.

The *Convert DXF Selection* function will convert any selected DXF entity into a *NoiseMap* object. An entity can be converted into Contour lines, Outlines (buildings, water, other boundaries) Roads, Barriers, hard/soft ground outlines or top/bottom of slope lines. (NB Entities cannot be converted into receiver points).

The height of the object can be obtained from the DXF line itself (if it is three-dimensional); from *NoiseMap* ground contours; or it can be entered manually. The object may not be at ground level and if you are getting the height from the DXF line or ground contours, then you would need to add some height to the local ground level to obtain the height of the object. For example, if you are entering a barrier which is 3 m above ground level, enter 3 in the **Add Height** box.

NoiseMap will fit a series of straight lines to the selected DXF entity, within tolerances set on the slider controls in the box. The smaller the tolerance, the greater the number of lines needed to fit the DXF entity. The number of DXF segments in the chain, and the number of *NoiseMap* lines needed to fit them to the set tolerance, is shown at the bottom of the screen.

The vertical tolerance will have no effect on 2-dimensional DXF lines.



DXF Curve Fitting Dialogue

Offset from centre

This allows the *NoiseMap* line to be displaced or offset from the line on which it is based. This is useful where there is no road centre-line in the DXF model, and you have to base your segments on the kerb line. It is also useful where you want to enter a roadside barrier, but you are basing its alignment on the road centre-line. Move the slider until the barrier or segment appears in the correct position.

Width

This allows the width of the object to be adjusted to fit the map, and saves you having to measure the width from the map. It applies to segments and barriers.

Note that width applies to the whole width of a barrier. However, it applies to one half of a dual carriageway, and also one half of a single carriageway, so a carriageway width of 5 m will appear 10 m wide on the plan. If the edges of the object line up with the outline of the object in the DXF file, then the correct width has been set.

Carriageway separation

This applies to all carriageways and is added to the width. It does not apply to barriers.

Reverse flow

Road segments are entered in the same direction as the DXF line on which they are based. During the fitting process, the direction is shown by a series of arrows alongside the segment. For two-way flows, the direction of the segments is immaterial, but for one-way flows, the direction of flow affects the gradient correction, so this must be entered correctly. Click this box to change the direction of the segment and traffic flow. Note: *NoiseMap* assumes that for two-way flows, traffic drives on the left.

Commit

This button converts the selected objects into *NoiseMap* objects. The relevant dialogue box will now pop up, to show the objects

you have just added. You can now add the extra details to the objects, such as a descriptive name, category, traffic flows and carriageway type. If you chose to get the height from the DXF line or ground contours, this will have been done for you. If not, you can now enter the heights manually or click on the **`Get height`** button, to get the height from any of the methods listed in the dialogue box.

SHAPEFILES

INTRODUCTION TO SHAPEFILES

Shapefiles are a type of digital mapping system. They can contain geographical and other information about any type of map object, such as a road, a building, or a railway line – any object that has a geographical location. Shapefiles were originally designed for use by ESRI ArcView Geographical Information Systems (GIS), but are now widely used for similar applications.

Shapefiles can contain much more information about an object than can be contained in a DXF file. For example, for a road they could contain information about the road surface and the traffic flow. *NoiseMap* allows you to load a Shapefile into *NoiseMap,* which can then convert the shapefile into noise model objects.

A shapefile contains at least two distinct parts. One of these contains the geographical information, i.e. the co-ordinates of the object, which can be two or three dimensional. The other part is a database that contains additional information about the objects. For example, if it is the shapefile of a road, the shapefile might contain information on road width and traffic flows. There may also be identifiers, such as a unique Topographical ID (TOID). These are contained in the database part of the shapefile. The database (.dbf) part of a shapefile can be opened in Excel (though Microsoft have dropped this functionality in the latest versions.)

The database part of the shapefile can be thought of as a table with a number of columns, each representing one type of information, such as the width of the road, the traffic flow on the road, or texture depth of the road surface. The information contained in a shapefile is not standardised, but depends entirely on the choices made by the person who created it. This means you will need to select the pertinent information from the shapefile and assign it to the correct *NoiseMap* objects. You will need to find out from your GIS specialist what each column name signifies. Some of the columns may not be required in the noise model, and so these can be ignored. If you are converting many shapefiles, this 'profiling' exercise can take some care and time. To avoid having to do it each time you load a shapefile, you can store a set of 'profiles' for future use, see 4:23. *NoiseMap* also contains a standard set of profiles which corresponds to the format used when you export shapefile data

from *NoiseMap*, as set out in *Default shapefile format* of this manual. *See also Export ShapeFiles, p 12:1.*

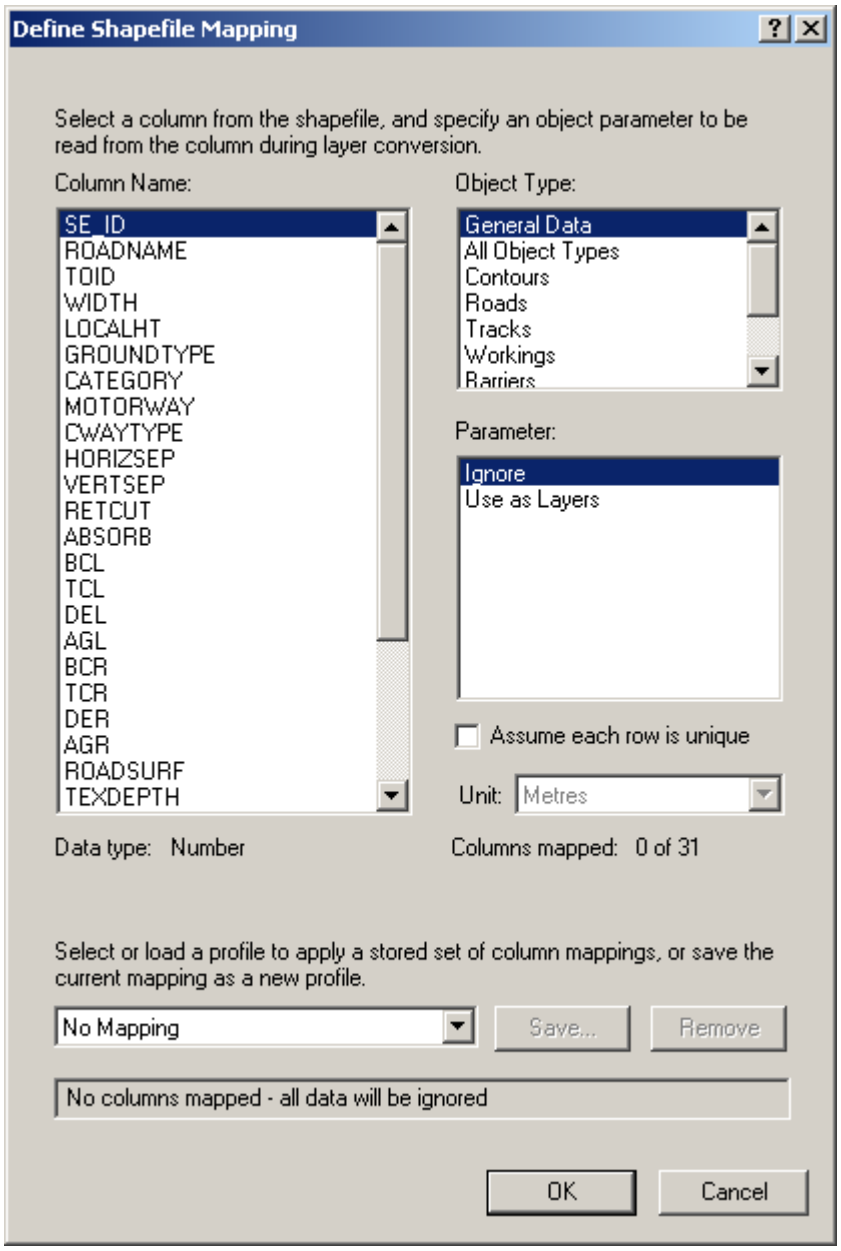
LOADING A SHAPEFILE

For reasons connected with the database operation, before you can load a shapefile, you must first load part of the scenario to which the new objects will belong, or which will be the parent scenario if you are creating a new scenario. (If you are creating a completely new database, which currently contains no information, then this requirement obviously does not apply.)

When you have opened the start scenario, to commence the loading process select **`View`**, **`Load Shapefile`**. A Select Shape File dialogue box will open and you can navigate to the file containing the Shapefile you wish to load. Highlight the file name and click Open.

SHAPEFILE PROFILE (COLUMN MAPPINGS)

A **`Define Shapefile Usage`** dialogue box opens. This allows you to choose which non-geographical parameters (attributes) in the shapefile will be linked to which *NoiseMap* objects, and which will be ignored.



Shapefile column mappings (profile)

Default Shapefile Profiles (mappings)

NoiseMap has a default set of column names which are used when a shapefile is exported from the system. If your shapefiles use the same mappings, you can automatically assign these and import the shapefile without assigning each column separately. Select or load a profile to apply a stored set of column mappings from the drop-down at the bottom of the window, or click Save to store the current set of mappings for future use.

Column name

If you wish to provide your own column mappings, proceed as follows. To the left of the window is a list of Column Names contained in the selected shape file. You will need to find out from the GIS specialists which parameter each column name defines. Quite probably many of them will not be relevant to the noise model.

For each Column Name containing data that you want to transfer to the noise model, proceed as follows.

- Highlight the **Column Name** you wish to transfer to the noise model
- Select the **Object Type** that the shapefile should create
- Select the **Parameter** of that object type that the selected shapefile column contains.

The following table shows the parameters available for each object type in the current version of the software. By default, all columns are set to *Ignore*.

Object Type	**Parameter**
General Data	Ignore (doesn't load the parameter)
	Include (loads but does not use parameter)
	Use as Layer (sorts data into layers according to value of this parameter)
All object types	Height
	Width
	Editable object ID (User supplied ID)
	Non-editable object ID (eg TOID)
	Description (currently N/A)
Segments	Editable *Traffic flow* ID (user supplied ID)
	Non-editable *Traffic flow* ID (eg TOID)
	Flow Rate
	Percent Heavy
	Speed
	Category
Barriers	FOA (currently N/A)
Contours	Ground type (currently N/A)
Receivers	Receiver type (currently N/A)

Assume each row is unique

You should tick this box whenever the parameter you are importing is different for each item of the input data. This will usually apply to the unique (non-editable) IDs, such as the TOIDS and traffic flow IDs. When you tick this box, the data will not be searched for duplicate values, thus speeding up the loading process.

Example shapefile set-up

The following table shows how a typical shapefile might be converted

Column name	Column description	Object type	Parameter
OD	Oscar ID	All objects	Non-editable ID (Unique)
LAE-ID	London Atmospheric Emissions Inventory ID	Segments	Non-editable flow ID (Unique)
Flow factor	Factor to convert from LAEI to actual flow	General	Ignore (not needed in noise model)
Category	Road category	Segments	Category
Speeds	Traffic speed	Segments	Speed
Heavy Percent	Percentage of heavy vehicles in flow	Segments	Percent Heavy
Total Flow	18-hour flow	Segments	Flow Rate
Width	Carriageway width	All objects	Width

Editable and non-editable IDs

ID values can be important in data management to identify items of information and to act as a link when information is used in different contexts. *NoiseMap* allows data items to have user-editable IDs, which the user can assign, and non-editable IDs which have usually been generated by some external source. Non-editable IDs cannot be changed by the *NoiseMap* user, since this would destroy the original external linkages. You should import externally-generated ID numbers as non-editable values so that the user cannot inadvertently alter them.

Usually, externally-generated ID numbers of objects will be unique (eg a building or road segment TOID, or a flow ID). In such cases, you should tick the check-box so that the import process does not spend unnecessary time trying to classify them.

AUTOMATED MODEL CREATION

Once a Shapefile or DXF file has been loaded, it will be displayed on the screen, but at this point it is still a digital drawing: it has not yet been converted into *NoiseMap* objects, and so cannot yet be saved to the database.

Size of area that can be converted

You should be aware that Shapefiles and DXF files can contain hundreds of thousands of objects and which when converted into *NoiseMap* objects could generate at least the same number of new objects. It is possible for the software to crash if the computer runs out of memory to allocate to the software. This

could leave the database in an unstable state, which will need to be corrected by the database administrator.

For this reason, it is not recommended to try to push the software to the limit (by loading DXF files that are hundreds of megabytes in size, for example). In dense urban areas, we would suggest that buildings should be converted in blocks of not more than 25 square kilometres. Further considerations in relation to conversion of buildings are given in a later section of this manual. For roads and ground contours, the blocks should be of a size such that there are no more than around 50,000 objects when converted into a *NoiseMap* model. It should be noted that the number of objects will depend on the conversion tolerance – a smaller tolerance will result in more objects and if you set the tolerance to zero, you could end up with hundreds of thousands of objects.

Converting a layer

You must now use **`View`**, **`Convert Layer`**, to transform the shapefile into *NoiseMap* objects.

Select the type of object you want to convert the layer into. You have the choice of:

- Contour line
- Road Segments
- Rail Tracks
- Site Workings
- Noise Barriers
- Receiver points
- Outline (buildings, water, etc)
- Top/bottom of slope
- Hard/soft Ground

Then click *Next*. The next dialogue box will depend on the type of object into which you are converting the layer.

ROADS

Roads require a large number of parameters to be set. A shapefile might contain many of the required parameters, but DXF files cannot supply them. Where parameters are missing, their values will be taken from the 'Convert Layer Defaults' [see page 4:30]. To reduce the amount of post-conversion editing, ensure these are set to appropriate values.

You will also need to set the conversion tolerance and how the segment heights are to be obtained. These are described in the following sections of this chapter.

You can also specify how the road width is to be imported [Shapefiles only], since *NoiseMap* requires the width of the one-way flow direction to be given.

Finally, you will need to state which of the layers are to be converted.

TRACKS, WORKINGS, BARRIERS, RECEIVERS

You must provide the conversion tolerance and state where the heights are to be obtained. The options are described in the following sections of this chapter. There is no provision for setting defaults for other track or workings parameters.

OUTLINE

If you choose *Outline*, you will now be asked to select the Outline Style. The options are:

- Building
- Water
- Area Boundary
- Address Point
- Line type 1, 2 and 3
- Annotation 1, 2 and 3

Split at tile boundaries

Check the tick-box if you wish objects to be split at tile boundaries. You will not normally wish buildings to be split at tile boundaries, since when you import the building into the model, you normally want to see all of it. However, items like rivers will normally have to be split at tile boundaries, as otherwise *NoiseMap* will import the whole object whenever it imports a tile that contains a part of it.

Smallest area

Enter the value for the smallest area to be imported. For buildings, you may consider that buildings with a ground area of less than 20 square metres (typically sheds and garages) are unlikely to be acoustically significant, so you would enter this value.

For water bodies, you may wish to choose a larger area.

Automatically generate height

NoiseMap will automatically assign a height to the objects that it converts. Depending on what height data is available, you may choose to obtain the height from the existing ground model, if you have already put one into *NoiseMap*. If the object is not at ground level (eg if it is a building outline) you may wish to add a certain amount to the ground level height (eg a building may be 8 m above ground level. If the layer information is three-

dimensional, you may wish obtain the height data from the layer – and again you can choose to add an amount to the base height.

HARD/SOFT GROUND OUTLINES

This is a conversion 'wizard' that tries to convert very complex outlines into hard or soft ground outlines. For example, the 'man-made ground' layer in OS mapping is likely to be hard ground, and can appear to be what is let over when other mapping features have been removed. The default values supplied can work well. For further information on this feature, please contact NoiseMap Ltd.

TOP/BOTTOM OF SLOPE

This converts non-level ground profiles into a *NoiseMap* ground model objects.

CONVERSION TOLERANCE

When *NoiseMap* converts a shapefile or DXF polyline into a *NoiseMap* object, you can control the closeness of fit (tolerance) between the shapefile or DXF lines and *NoiseMap* object lines. This reduces the number of *NoiseMap* objects needed to represent the original mapping whilst maintaining an acceptable precision. The acceptable precision varies between object types. For example, road segments usually demand a closer fit than ground contours.

An excessive amount of data will not improve the calculation accuracy, but can greatly reduce calculation speed, so an appropriate conversion tolerance is desirable.

Horizontal and vertical tolerance control

There are slider controls that allow you to set the tolerance of the conversion:

- Horizontal tolerance
- Vertical tolerance

Road segments

Typical conversion tolerances for road segments might be 1 m horizontally and 0.5 m vertically.

Ground contours

Remote surveying techniques such as Lidar are revolutionising the gathering of topographical data, which is now sometimes being provided at 25 cm vertical interval, compared with the 5 m vertical interval available from historic Ordnance Survey levelling data. However, noise models require information on the location of the cut/fill lines that mark the edges of features such as embankments and cuttings rather than level contours which tend to run diagonally across such features. Although *NoiseMap* will accept such level contours, they are wasteful of processing time. Noise modellers are advised to request the

cut/fill 'profile' lines to be provided by the surveyors, and to enter these into *NoiseMap*.

Where it is desired to convert level contours, then normally a 5 m horizontal tolerance is acceptable. The vertical tolerance will have no effect for horizontal contours, but it is advised to leave this at 0.5 m, as a zero tolerance can cause problems.

Building outlines

The conversion tolerance controls are ignored when converting building outlines, as these are stored to full precision.

AUTOMATICALLY GENERATE HEIGHT

This control gives you the following options:

- *RoadNoise* Ground Model
- DXF (ie Shapefile) Line
- Define as height above local

When you have a *NoiseMap* ground model loaded, then as the objects are converted, the ground model is queried to find the local ground level at each point. You can add an amount to this, to obtain the height of the object if this is not at ground level. For example, if all buildings are 8 m above ground level, then set the amount to be added to local ground height in the box labelled: **Additional height to add**.

If you choose to obtain the height directly from the Shapefile, any additional height you request will still be added.

If you choose to define the height above local, then the local ground level is not ascertained. Instead, the height above ground will be taken from the **Additional height to add** box.

The Convert Layer dialogue box lists the layers imported from the Shapefile (there will only be a single layer unless the Shapefile contained a parameter to distinguish between different types of object).

It is possible that the imported Shapefile will not contain all the parameters needed to define an object. In this case, default values will be provided. The default values can be adjusted by the user, as described in the following section.

EDIT CONVERT LAYER DEFAULTS

This dialogue box defines the values to be used for certain parameters when importing them from a shapefile layer using the 'Convert Layer' method. If any of the values are not defined by the shapefile, then the default value will be used instead. The parameters than can be defined and their pre-set defaults are shown below. You can change these as required prior to

running the Convert Layer procedure, using the **Edit**, **Edit Convert Layer Defaults** dialogue.

- Flow Rate 1000
- Flow Speed 100.0
- Flow PHV 15.0
- Traffic basis Not gradient corrected
- Local height 0.0
- Flow multiplier 1.0
- Segment width 5.0
- Segment Category 1
- Surface type Bitumen
- Depth/Correction 2.0
- Road type Non-motorway
- Carriageway Normal 2-way road
- Horizontal separation 0.0
- Vertical separation 0.0
- Ground type Hard

SEGMENT TOOLS

You may need to undertake some editing work on segments that you have imported from a DXF or Shapefile. The **Edit**, **Segment tools** function provides some useful tools to help:

- Set local height
- Set retained cut
- Reverse segment chain
- Delete contours from segments

SET LOCAL HEIGHT

This is used when importing a DXF. It lets you choose a layer that contains the height of the top of any flyover, and it then sets the height above ground of the relevant segments. By choosing the option: *Do you want to recalculate segments with values already set?* – you can recalculate height data for all segments.

SET RETAINED CUT

Enables you to enter the retained cut values for a segment.

REVERSE SEGMENT CHAIN (SHORTCUT CTRL-X)

This reverses the direction of selected chain of segments. Use for one-way roads and roundabouts.

DELETE CONTOURS FROM SEGMENTS

Removes any ground height contours that cross a road segment

HARD GROUND OUTLINES

NoiseMap contains special tools to allow complex areas of hard ground to be simplified. These tools let *NoiseMap* find and extract acoustically significant areas from a shapefile such as the OS 'man-made ground' layer. Please contact NoiseMap Ltd for guidance on these tools if you are contemplating their use.

ADDING BUILDING OUTLINES

Building outlines have two functions in *NoiseMap*:

- To act as noise barriers in calculations
- Improve the visual appearance of a noise map by shading the building areas.

Other types of outlines

Several other types of Outline are available in *NoiseMap* and these are described below under 'Marking out and annotating noise models'.

Automatic creation of building outlines

An automatic algorithm will attempt to convert all objects in a specified map layer into building outlines. Because of the way that digital maps are drawn, and because of the complex outline of many buildings, the algorithm may not find every building outline, in which case it will be necessary to complete the missing areas using one of the manual methods provided. However, if Ordnance Survey Mastermap is used, conversion should normally be 100 % successful.

To use the automatic method, firstly load up the digital maps (DXF or ESRI Shapefile format) that you wish to convert and check which layers contain the building outlines that you are going to convert. The map needs to have each object type in a different layer. The system will convert objects from any number of different layers, although OS maps generally have building ground level details in layer G8010001 and overhead building details in layer G8010004.

From the View menu, select **`Convert Layer`**

In the **`Layer Conversion`** dialogue box, under **`Object to convert into`** choose **`Building`**

If the buildings are to be used in as barriers in noise calculations, they will need a height, so check **Automatically generate height** and in the drop-down list, choose where the base height data should be obtained. Add the height above base in the **Additional height to be added** box. Then click **Next**.

You will now see a dialogue **Layer to Convert** that displays a list of layers in the DXF file. Highlight all the layers to be converted and click **OK**.

The automated process will find as many buildings as it can. These will be shown by a pale blue outline, but it may be clearer to see what has been done by filling the outlines. Go to **View, Display options** and under **Building Outlines** select **Solid**. Any building outlines that remain unconverted must be completed by hand, using the following procedure.

Manual conversion

Building outlines shown on DXF maps can be manually converted into *NoiseMap* building outlines, using the 'Select' method, or they can be entered completely manually by tracing over the map outlines with the mouse. These are described in the following sections.

SELECT METHOD OF ADDING BUILDING OUTLINES

Click the **Add Elements** button and click '**Select method building outline**'

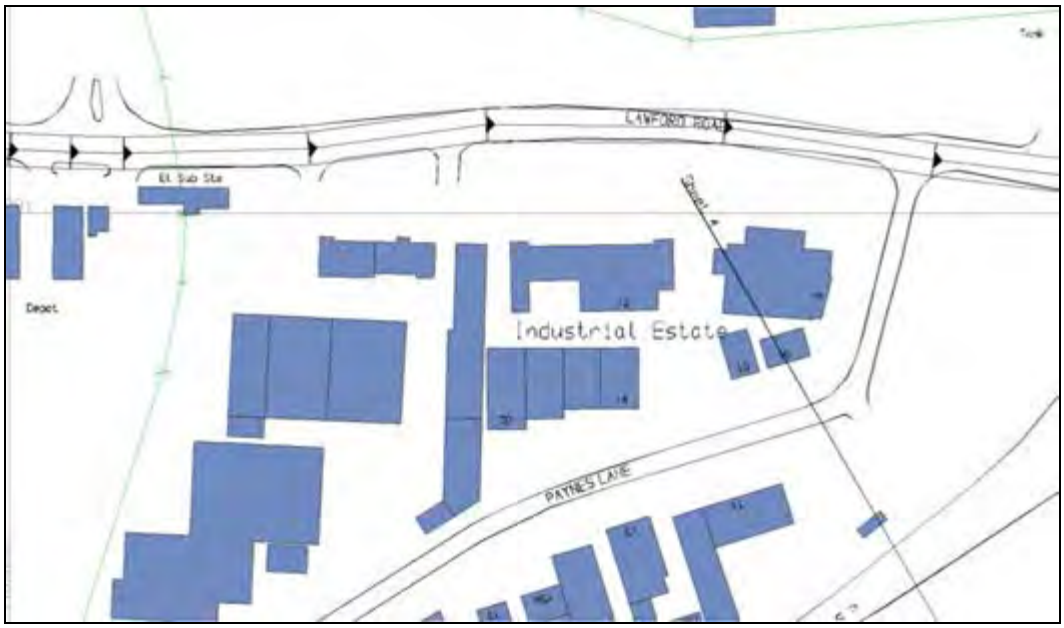
Select 'Automatically generate height' and choose where *NoiseMap* is to obtain the base height data in 'Get height information from'. Also enter the additional height to be added to the base to get the height of the building. Click **OK**. To create a building outline:

- Point mouse at a building outline, and click to select it. It will become bold.
- Press **Insert** key. The outline will turn pale blue and a box will show the starting point of the outline, and an arrow will show the end. If it goes in the wrong direction, press **Home** to reverse the direction.
- Click on the next section of the outline. At a T-junction, it is possible that the line takes the wrong direction. Press **Home** to reverse the direction.
- If there is a gap between the end of the last line and the start of the next, the outline will cross the gap.
- Work around the outline, and when you back to the beginning, press **End** to close the outline and to finish it. You may now start on the next outline.

Manual method of building outlines

In some very complex urban areas, it might prove simpler to enter the outlines manually by selecting 'Building Outline' from the Add Elements dialogue box and simply tracing around the building blocks with the mouse.

MARKING OUT AND ANNOTATING NOISE MODELS



An example of Annotation:
Kerb lines - Line Type 1; Break lines - Line Type 2; Building descriptors - Annotation 1; Building numbers - Annotation 1; Street Names - Annotation 2; Area names - Annotation 3. All these were obtained automatically from Shape Files. Note also the AddressPoints – shown as red crosses within each building.

NoiseMap contains several types of outline in addition to Building Outlines, which can be used for marking out and annotating noise models:

- Building
- Water
- Area Boundary
- Address Point
- Line type 1, 2 and 3
- Annotation 1, 2 and 3

Buildings are a special type of outline as described above.

Water outlines appear as a turquoise area but are only used to mask the noise contours. They are **not** treated as hard ground outlines.

Area Boundaries appear as a pink area but are only used to mask the noise contours. They are useful when you wish to mask

noise contours that extend beyond the study area. They are **not** treated as ground or building outlines.

Address Point is a feature of the UK Post Code system. A special database is available under licence (not from NoiseMap) which has the full address of most occupiable buildings in the UK. It is a database of points defined by their OS National Grid Co-ordinates and provides the address of each building. This can be used to assign addresses when you generate receivers automatically around building outlines, see p. 11:8.

Three **Line Types** are available. They can be used for drawing any sort of line on the noise map, which can then be labelled. Uses might include:

- Kerb lines
- Break lines between sheets

Each line type can be separately displayed or hidden. Each line can have a label, and the label of each line type can be displayed or hidden. The line types also differ in that line type 1 has a small font, line type 2 has a medium font, and line type 3 has a large font. The line thicknesses are the same.

Three types of **Annotation** are available. These can be used to add descriptions to a noise model, e.g.:

- Street and District Names (can be automatically generated from a suitable shape file)
- Information notes

Each annotation type can be separately displayed or hidden. The labels differ in size: Annotation 1 has a small font, Annotation 2 has a medium font, and Annotation 3 has a large font.

ADDING AREAS AND ANNOTATION MANUALLY

To add an area, line or annotation manually, click the Add [+] button on the toolbar and select Outline as the object to add. Click around the outline, or if an annotation, click and drag a line of the appropriate length and right-click to terminate. Enter the required text in the Identifier box and then select the outline type from the drop-down list.

DISPLAYING THE AREA OR ANNOTATION LABELS

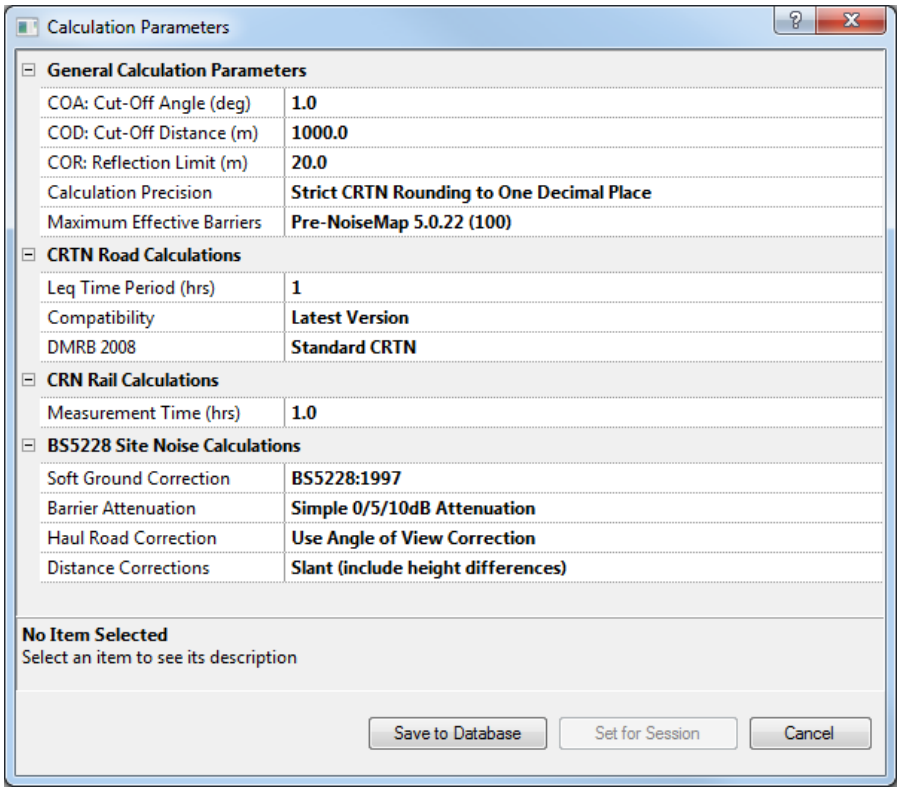
In order to display any of the above Outline types, go to View > Display Options and ensure that the On button is selected. Then click the Outline Types button and select all the outlines you wish to display. To show the labels, click the Labels tab, and ensure that the Outline Labels and Ident String boxes are checked. Then click the Outline Types button and check the boxes of the outline types that you want labelled.

CALCULATION PARAMETERS

Noise calculations depend on certain parameters that are set from the **`Parameter, Edit Calculation Parameter`** menu.

The parameters are split into sections according to whether they affect all calculations, or whether they apply only to certain types of calculation.

The calculation method is no longer set in this menu. Instead it is selected as part of the calculation set-up procedure, see *Calculation Method* in the Index.



Calculation parameters

GENERAL CALCULATION PARAMETERS

This section allows you to set:

- COA – Cut-off angle. This is the smallest angle that a segment-type object may subtend at the calculation point in order to be considered.
- COD – Cut-off distance. This is the furthest [usually perpendicular] distance between an object and the calculation point in order to be considered.
- COR – Cut-off for reflections. This is the greatest distance that a reflecting surface may be on the far side of the source in order for reflection to be considered.

- Calculation precision: This sets the rounding method used in calculation. CRTN and CRN define stages at which results are to be rounded to the nearest 0.1 dB (in the direction that gives the higher noise level). This rounding ensures that rounding uncertainties are in the favour of a point being considered for statutory noise insulation, and is a requirement of the procedures. However, it causes irregularities in noise contours, which have a better appearance if they are calculated to 'full precision'. *NoiseMap* undertakes noise calculations to 32-bit accuracy in most cases, which has a precision of about 7 decimal figures. Some geographical calculations are made to 64-bit accuracy (15 decimal figures) owing to the wide range of possible values of co-ordinates.
- Maximum effective barriers: the maximum number of barrier segments used when assessing the screening of a source segment.

CRTN ROAD CALCULATIONS

Leq (NAC) Time Period

This parameter is used to define the time period represented by the traffic data when undertaking Leq calculations according to the Noise Advisory Council (NAC). It may be any reasonable value.

(For L10 calculations, CRTN only defines 1-hour and 18-hour periods: it is not necessary to set TIM for this, as the time period is set with the traffic flow data.)

Compatibility with earlier versions

Set compatibility with v 8.06 – use only when required for compatibility with historic calculations.

(Note: the option to set height calculations to be compatible with *NoiseMap 2.51* or before is now set from **`Parameters`**, **`Program Options.`**)

DMRB 2008

Implements additional procedures advised in DMRB 2008.

BS5228 SITENOISE CALCULATIONS

The following calculation options are set here:

- Soft Ground Correction
- Barrier Attenuation
- Haul Road Correction
- Distance corrections

See *SiteNoise* 98 manual for full guidance.

STORING THE CALCULATION PARAMETERS

You should note that calculations being done either locally or from the calculation queue normally use the values of the Calculation Parameters that are stored in the database. This is to ensure that the results will be consistent whatever the setup of individual computers.

Save to database

When you are sure that you have set the calculation parameters correctly, you can save the values in the database by clicking this button. You should use this with care, as it will affect all calculations being done by yourself and others.

Set for session

Clicking this button will save any changes you have made to the calculation parameters to you local machine for this calculation session only. This allows you to test alternative calculation settings without affecting any calculations being done by other machines. When you quit and restart the session, any 'set for session' settings will be discarded and the database settings will be downloaded for use in any calculations.

CATEGORIES AND COMBINATIONS

It is a common requirement to determine how much noise the various parts of a scheme are making to the total noise at a receiver or grid point. *NoiseMap* allows you to assign each road segment, railway track segment and site activity to one of up to 100 user-defined categories of noise source. These could be major roads and minor roads, unaltered and new roads, roads with more than a certain traffic volume, mainline and branch line railway tracks, mobile and static site activities, or any other distinguishing feature.

You should assign each segment, activity or train service to a category. *NoiseMap* will then show the noise produced by any combination of categories. These calculations are made when the contours or receiver calculations are first made, and it is the results of these category combinations that are stored in the database. It is therefore crucial that you to set up the categories and combinations before running any calculations.

Setting up categories

The following example assumes you are setting up three categories, representing unaltered, altered and new activities. These could be new segments of road, new segments of railway track or new site activities.

To set up the categories, select **`Parameters`**, **`Edit Categories`** from the main menu. You will note that category 1 is already present. You need to add nodes (categories) 2 and 3. Click **`Add Node`** to do this.

Creating category combinations

Now you need to add names to the category combinations. Click **Add Combo**. In the title box in the centre of the screen, the name New Combination appears. Change this to Unaltered and click **Update**. Now click **Add Combo** again, and change the title to Unaltered + Altered, and click **Update**.

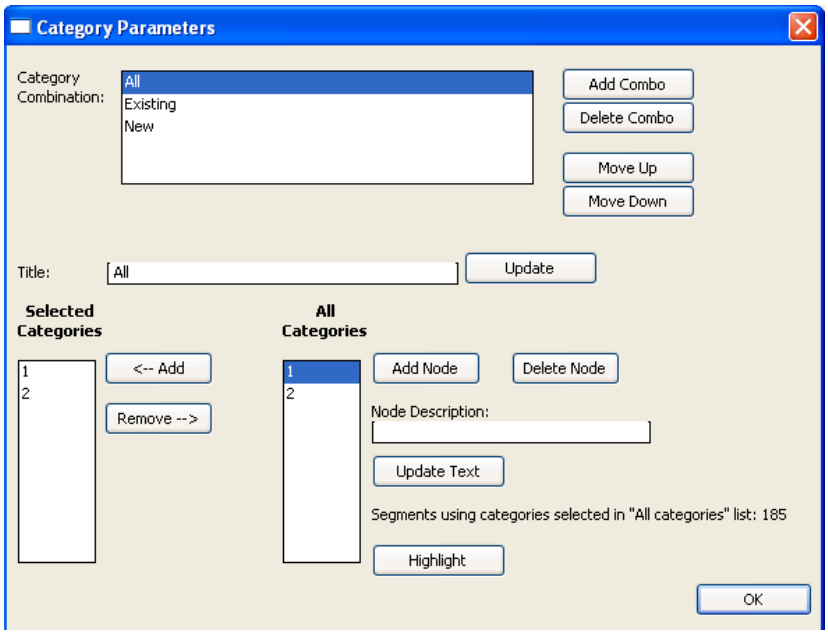
Now the names are in, you need to assign the correct categories to each combination. By convention, *NoiseMap* usually assigns categories as follows:

- Category 1 - Unaltered
- Category 2 - Altered
- Category 3 - New

The first combination **All** only has category 1 assigned at present. You also need to add 2 and 3. Select the Category combination **All** at the top of the screen, then in **All categories** highlight 2 and 3, and click the Add button. Next select Unaltered + Altered at the top of the screen, in All Categories highlight 2 and click **Add**.

As a check, when you click the Category combination **All**, this should show Selected Categories 1, 2 and 3; when you click on Unaltered, this should show Selected Category 1; and when you click on Unaltered +Altered, this should show Selected Categories 1 and 2.

You are limited to 100 Categories (nodes) and 100 category combinations: you can use all 100 categories in any category combination.



Category parameters

Assigning categories to segments

When the category combinations have been created, the noise sources need to be put into the correct categories. Return to the graphical screen. For roads, select a segment and then select **Edit**, **Complete chain selection** from the main menu. The chain of segments will be selected. Now click the editing button on the toolbar and in the segment properties screen, click the drop-down categories list and choose the appropriate category from the list. Repeat this process for all segments. An equivalent procedure is used for Rail and Site noise sources, described in relevant section of this manual.

EDIT BARRIER ADJUSTMENTS

When undertaking design work, you may wish to optimise the height of the noise barriers in your scheme. *NoiseMap* provides a way of making quick adjustments to a range of barriers in order to test the effectiveness of various barrier arrangements.

Firstly, you should assign the barriers that you are designing to one or more of the ten available barrier adjustment layers. You do this by selecting the barrier and then in the barrier properties dialog box, you select which one or more layers are to be active for this barrier. Now select **Parameters**, **Edit barrier adjustments** and for each of the adjustment levels, set the amount of height adjustment to be applied to all barriers assigned to that level.

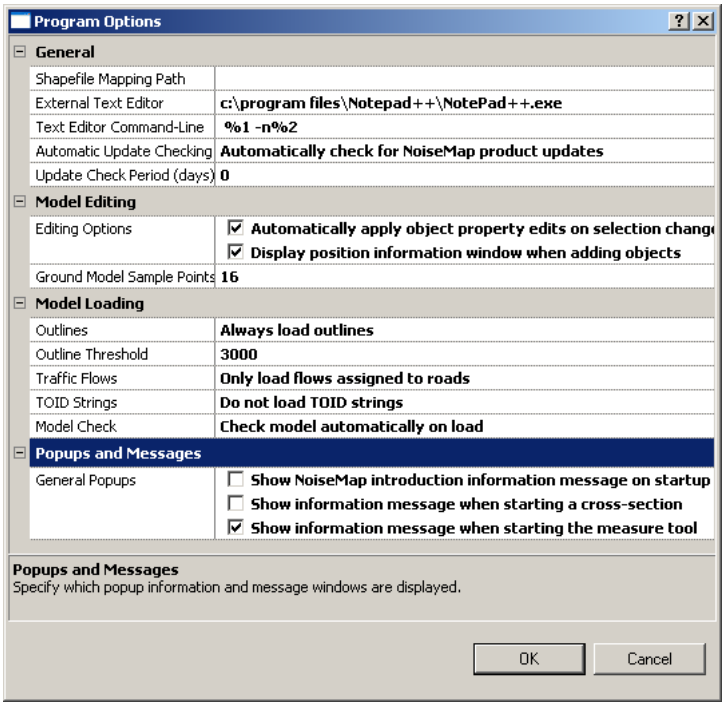
There are 10 level adjustment layers available, and you could give each adjustment layer a different amount of adjustment. For example, you could set the Level 1 adjustment to be 1 m, Level 2 to be 2 m, Level 3 to be 2.5 m, and so on.

The adjustment **levels** apply to all tiles in all scenarios, but you can assign a barrier to one or more different adjustment **layers** in each scenario.

The height adjustment is only applied at calculation time: it is not permanently added to the barrier. For this reason, it is recommended that once you have decided on a barrier arrangement for a particular scenario, you should permanently update the barriers to the required height. This will ensure that any subsequent changes to the height adjustments will not affect the scenarios that you have already calculated.

PROGRAM OPTIONS

This allows you to control certain program behaviours which are not associated with noise calculations.



Program options

GENERAL OPTIONS

Shapefile mapping path

Shapefile mapping profiles tell *NoiseMap* which columns in the shapefile are to be mapped to which *NoiseMap* parameters. You can enter a file path here for *NoiseMap* to search for the appropriate mapping. For more information, see *Shapefile Profile (column mappings), page 4:23*.

External text editor

This allows you to select a text editor for use when editing script files. Enter the full path name. See help on Script Interface for more details.

Text editor command line

The command line will be fed to the script file text editor and allows it to open the correct file at the chosen line. The variable %1 will contain the filename of the script file and the variable %2 will contain the line number that you have clicked on.

Automatic update checking

This offers you the option for *NoiseMap* to check automatically for program updates. For this to work, you must be connected to the internet. If there is an update to your version of *NoiseMap* and you have current maintenance, you will be offered the opportunity to download the update.

Update check period

This sets the frequency with which *NoiseMap* checks for updates and is set to 7 days by default, which means that you will receive

the update within 7 days of its release. A repeat of 0 will check on every start-up and a repeat of 1 will check every day.

MODEL EDITING

Editing options

This allows you to activate two editing options:

- Automatically apply object property edits on selection change – this will apply any changes that you make to an object's properties as soon as you select another object, without asking or warning you first. This can be convenient, but you need to be careful not to make changes inadvertently;
- Display position information when adding objects – position information helps with precise positioning of objects, but the information window can be intrusive on crowded models.

Ground model sample points

When getting the height of an object from the ground model, *NoiseMap* uses the closest ground contours along the specified number of vectors spaced equally around the point of interest. If you specify four vectors, these would be north, south, east and west. Increasing the number of search vectors will increase the sampling accuracy particularly when there are few ground contours, but if you have a large number of ground contours, it may be desirable to reduce the number of search vectors.

The default value of 16 vectors seems to give reasonable accuracy for a wide range of models. However, when the model has a high density of contours, reasonable accuracy can be obtained with a reduced number of search vectors (12 or even 8), keeping the search time reasonable.

MODEL LOADING

Outlines

This tab lets you control how building outlines are downloaded from the database. You have three options:

- Always load outlines
- Never load outlines
- Prompt to load outlines if above threshold

Outline threshold

If you have chosen the last of the above options, you will need to set the threshold for the number of outlines that can be downloaded without asking for your approval. Enter your desired threshold (set to 3000 by default).

Traffic Flows

Choose from the drop-down options:

- Only load flows assigned to roads – this is quicker for large models, but flows not assigned to roads will not appear in the traffic flow list;
- Load all traffic flows in model – this increases download time, but ensures that unassigned flows appear in the traffic flow list.

TOID strings

Choose from the drop-down list:

- Load TOID strings from database – the TOIDS are long character strings that can greatly add to the download time.
- Do not load TOID strings – generally, you do not need the TOIDs, so if you do not download them, calculation times will be reduced.

Model check

This gives an option to check the model for duplicated objects and other problems every time a scenario is loaded, but this may be unnecessary on well-established model and may take time. You can check later by selecting **`Check Loaded Model`** from the **`Calculate`** menu.

POPUPS AND MESSAGES

NoiseMap has a number of information messages that can provide useful information, but experienced users may find them intrusive. Here, they can be disabled (or re-enabled) by un-checking or checking the boxes.

- Show *NoiseMap* information message on start-up.
- Show information message when starting a cross-section
- Show information message when starting measure tool

WORKING WITH BITMAPS

NoiseMap supports two types of digital image:

- Vector images - e.g. DXF files which are made up of lines drawn between points: this is an efficient method of creating detailed maps capable of high resolution on a wide range of devices; amenable to automatic processing, but often labour-intensive to create.
- Bitmap images - made up of dots: easy to create on a scanner or to capture from a screen image, but memory-hungry at high resolutions and less amenable to automatic processing.

Bitmaps provide a good base for superimposing results and for creation of *NoiseMap* models, provided the physical size of the base-map is not too large: generally, up to A3 in size.

SCANNING BITMAPS

If you will be using the bitmap for trace-digitising to create a *NoiseMap* model, it should be scanned in a low-resolution (70-100 dpi) 16-colour or true-colour Windows bitmap format (not JPEG, TIF or other picture format). For a printed presentation, you may need a higher resolution, but only when your work is complete. High-resolution maps which cover a large area require a considerable amount of memory and may be slow to process. If the scanned image needs to be scaled, cropped or rotated, you should do this before loading, as this is not possible within *NoiseMap*, except for choosing the area to be plotted. Windows Paint accessory can be used to convert high-resolution scans to low resolution. By judicious choice of resolution, you should usually be able to get a satisfactory bitmap in less than 100 kbytes of memory.

Unless you have a pre-calibrated bitmap (see below), you will need to know the exact co-ordinates of two calibration points on the bitmap on the same Y-co-ordinate (northing) but different X-co-ordinates (eastings) so that *NoiseMap* can create the model at the right scale. One way of doing this is to capture a bitmap that already has a co-ordinate grid drawn on it. Alternatively, you could identify the co-ordinates of two points on a scaled map that are also visible on the bitmap.

LOADING A BITMAP

Before you can load the bitmap, you must have a scheme loaded. You should choose initial display co-ordinates approximating to the area of the bitmap image, otherwise you may not be able to see the bitmap once it is loaded, until you have scrolled it into the view (*see Centre View*, below). To load the image into *NoiseMap*, click **`View`**, **`Load Bitmap.`** In the **`Files of type`** drop-down, you can select:

- **`bmp`** – an uncalibrated bitmap that you will need to calibrate; or
- **`rnb`** – a bitmap that you have already calibrated in *NoiseMap*.

Choose the appropriate type and then navigate to the bitmap file.

WORLD FILES

Some GIS and digital drawing systems can export a bitmap along with a 'World File' which contains the bit-map calibration (geo-referencing) data. These form a pair of files, a **`.bmp`** file and a **`.bpw`** file. If *NoiseMap* finds a **`.bpw`** file in the same folder when loading a **`.bmp`** bit-map file, you will be asked if you wish to use the **`.bpw`** file instead of manual calibration. If you choose to do so, then the bitmap will use the **`.bpw`** calibration data.

BITMAP CALIBRATION

When you have loaded an uncalibrated bitmap, the Bitmap Calibration window will open. Using the Cursor, Page Up and

Page Down keys, find the first calibration point that you have chosen. Use a large zoom to ensure that you can position the mouse cross-hairs accurately, and click. Enter the co-ordinates of the point. Now move the bitmap to show the second calibration point, click on it and enter its co-ordinates. Then select **Calibrate**, **Exit** to return to the graphical screen. Prompts are shown in the status bar to help you.

If the bitmap needs to be refreshed while calibrating, pick **View Mode**, **Reset** from the menu. This menu also lets you switch to Zoom mode to make it easier to choose the calibration points. Remember to switch back to Pick mode before entering a calibration point.

SAVING CALIBRATED BITMAPS

You can save the calibrated bitmap as a special **rnb** file, which can be reloaded from the **Load Bitmap** menu without re-calibration (by selecting files of type **rnb**). When you save your *NoiseMap* model, this will also record information on any calibrated bitmap file currently loaded so that it can be re-loaded next time you open the model.

LOCATING THE BITMAP

If you lose the bitmap, firstly check that it is loaded and switched on (the bitmap toolbar button should be bright). Then select **View**, **Centre view around bitmap**. This puts the bitmap into the centre of the view.

MOVING AROUND THE BITMAP

In the graphical screen, the orientation of the bitmap is fixed. The model grid will be shifted to fit it. However, you can pan and zoom using the normal toolbar or keyboard functions.

TURNING THE BITMAP ON AND OFF

You can turn the map off when it is not needed, by clicking the Picture tool-bar button. This can speed up navigation of very large bitmaps. If you want a bitmap to be saved when you save the model, ensure that it is turned on.

5. NAVIGATION AND EDITING

BASIC OPERATION

NoiseMap has two windows, the Graphical Window, where the model appears as a diagrammatic representation, and the Output Window, where a log of the operations is shown, the model parameters can be displayed and the results of calculations can be displayed.

You work in the Graphical window when creating and editing models and showing noise contours. Where individual receivers are used, they can be labelled with calculated noise levels in the Graphical window.

The Output window helps you to keep track of your work and reports warnings and errors. It is advisable to check the Output Window whenever there seems to be an operational problem. For details see Chapter 16 The results output window and Chapter 17 NoiseMap Script Interface.

The status bar will show buttons for the two views as one way of switching between them. Alternatively, select **`View`**, **`Results Window`** from the menu bar.

THE GRAPHICAL WINDOW

You will work in the Graphical window when creating and editing models, and in the Output window when undertaking calculations.

Graphical Modes

The Graphical window can be in one of six modes, shown by which toolbar button is selected. Modes affect the mouse action as follows:

- **Select** mode - the mouse can be used to select an object
- **Move** mode - the mouse will move the selected object
- **Pan** mode - the mouse will move the view of the model
- **Zoom** mode - the mouse changes the size of the view
- **Rotate** mode - the mouse rotates the view
- **Add** mode – adds geographical objects to model using mouse

The status bar

The status bar at the foot of the Graphical window presents various items of information relating to movement of the mouse.

- In Select mode, it usually shows the co-ordinates of the mouse cursor, the angle of rotation of the model and the Tile ID.
- In Move mode, it will show the amount by which an object has been shifted.
- In Add mode, it prompts some user actions.
- When a noise contour is displayed, it shows the noise level at the cursor position.

The graphical model

The graphical window shows a plan view of the model. The source segments are shown as white rectangles with the centre-line marked. Ground contours and ground profiles are shown in green. Ground profiles are similar to contours, but usually delineate some ground feature such as the top or bottom of an embankment. This means that, unlike contours, they may vary in height along their length.

Barriers are shown in red. They can be purpose-built noise fences, or any object which may screen noise, such as a row of buildings. Barriers which have gaps in them (such as a row of semi-detached houses) are shown with a dotted line. The spacing of the dots is indicative of the fractional open area of the barrier. Receiver points are locations where *NoiseMap* will calculate noise levels. They are often placed close to a building façade, in which case the direction of view is important. They are represented with a T or a V. The long stem of the T, and the open arms of the V, point in the direction in which the receiver is facing. If a receiver has a 360 ° unobstructed view (called free-field) then it is shown with a + symbol.

In most cases, the ground is predominately soft (noise-absorbent), but there may be areas of acoustically hard ground (this can be hard paving or other reflective surfaces, such as water). These can be outlined in the model, and appear in blue on the graphical display.

You can display the map reference grid by clicking this button.

NAVIGATION

There are several ways to move the view around the Graphical window. This is called Navigation.

WITH MOUSE WHEEL

Panning and scrolling

Rotate the mouse wheel up and down to move the map vertically. Press the left mouse button or Shift key and rotate the mouse wheel to move the map horizontally.

Zooming

Press the right mouse button or Ctrl key and rotate the mouse wheel up and down to zoom the display in and out (i.e. make it larger or smaller).

WITH CURSOR KEYS

Panning and scrolling

You can pan and scroll using the four cursor keys on the keyboard.

Zooming

You can zoom the picture using the keyboard:

- PgUp (the page up key) makes the picture larger
- PgDn (the page down key) makes the picture smaller

WITH TOOLBAR BUTTONS

Panning and scrolling

There are two toolbar buttons for panning and scrolling.

Select this button and then click anywhere in the graphical window. As you drag the mouse, the selected point follows the mouse. This allows you to position accurately any visible part of the plot within the screen area.

Select this button and then click the mouse anywhere within the graphical window. As you drag the mouse, the picture will move in the direction you move the mouse. The further you move the mouse, the faster the picture will move. Release the mouse button to stop the movement. On slower machines, movement may continue slightly after the mouse is released.

Zooming

There are two toolbar buttons for zooming:

Select this button and then use the mouse to draw a rectangle around the area you wish to see on the screen. Position the crosshairs then click the mouse and drag the pointer to the diagonally opposite corner of the area you wish to see. You can only zoom in (enlarge the view) with this method.

Select this button and click anywhere within the Graphical window. The view zooms in when you drag the mouse upwards, and zooms out when you move downwards.

Rotating the view

Sometimes you can see more of the model if you rotate it from its normal north/south orientation. Click this button to rotate the view about the centre of the picture. Click and drag the mouse left to rotate the view clockwise. Click and drag the mouse right to rotate the view anticlockwise. Alternatively, you can rotate the view by pressing Ctrl+ left (or right) arrow key. [You cannot rotate the view when a bitmap is on the screen.]

Restoring the view

To restore the view (so that the whole model can be seen in the Graphical window) click this button.

FIND

The **Edit**, **Find** function allows you to select objects according to the value of any non-positional parameter, or according to the object's ident (description). You can search for a single value or a range of values, e.g:

```
10.2
```

searches for any object where the chosen parameter is exactly 10.2.

```
10>11
```

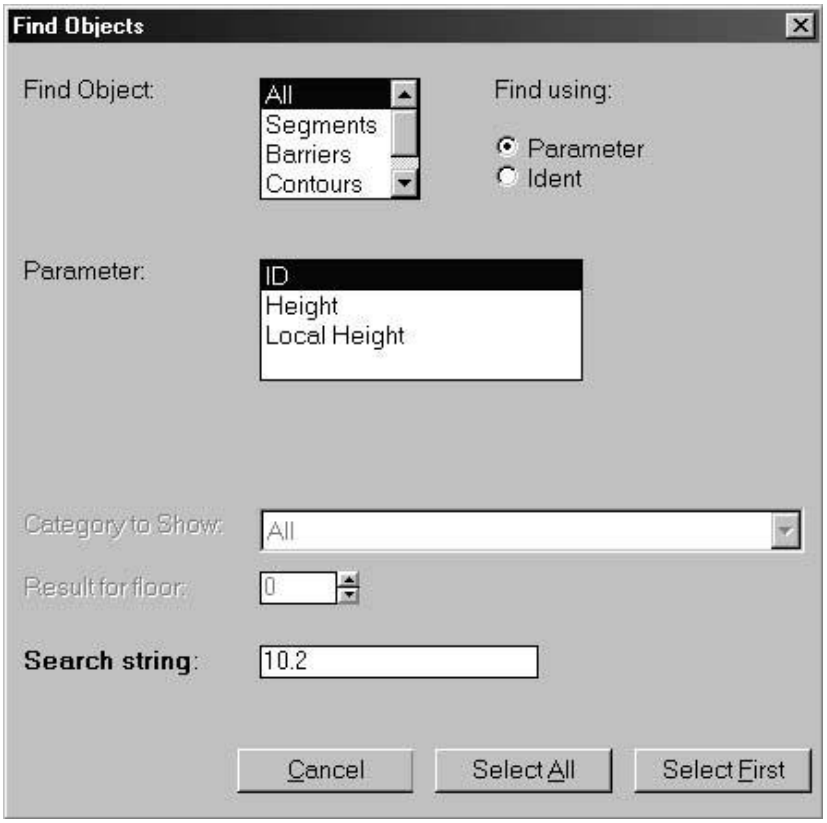
searches for any object where the chosen parameter is between 10 and 11 (inclusive).

```
11.8>
```

searches for any object where the chosen parameter is greater than or equal to 11.8.

If you choose to search by Ident, then the search will locate any object containing the search string within its Ident description.

Find may not operate on all object types: available options are shown on the drop-down list in the **Find Object** box. The available search parameters vary according to the type of object selected.



Find dialogue box

FIND NEXT (F3)

Press F3 to search for the next occurrence of the search item.

POSTCODES

You can use a postcode to download an area from the database, provided you have the requisite AddressPoint database loaded onto the server. (You must load AddressPoint in a separate operation as there is currently no automatic function to do this in *NoiseMap*.)

The use of this feature is described on page 4:8.

The location of the postcode reference point will be marked. The **`View`**, **`Show Postcode`** function switches the displayed post code marker on or off.

SELECTING AN OBJECT

Before you can edit an object, you must first select it. There are many ways of doing this, as follows:

POINT AND CLICK

Ensure that you are in **Select Mode** by clicking the arrow button in the toolbar. Then pointing at the object and clicking. You can add to the selected objects by holding down the shift key and clicking on more objects.

Multiple and overlapping objects

If objects are overlapping, then as you click on a point, the selection cycles through each object at that point one by one. If you press shift as you do this, it will eventually select all the objects.

Greying out

With the Point and click and particularly with the Enclosure method (below), you may find it easier to select a particular object if you firstly grey-out or turn off objects you want to ignore using the View > Display Options > Labels dialogue.

Deselecting

You can de-select selected items by pointing at the item, holding down the shift key and clicking. Pressing **`Escape`** deselects all objects.

ENCLOSURE METHOD

If you want to select a large area of objects, then you can click with the mouse and drag a rectangle over the area. All objects within the rectangle will be selected.

COMPLETE CHAIN SELECTION

If have selected one or more objects in a chain, you can select the rest of the chain by choosing **`Edit, Complete chain selection`** or by pressing **`Ctrl + R`**.

FIND

The find method puts all matched objects into selected mode. This is a very powerful way of selecting groups of objects with a property that needs to be changed, for example you may want to assign all segments of type 'Motorway' to be category 10. You would find all segments of type Motorway, and then in the multiple objects dialogue, change the Category to 10.

MANAGER SCREENS

Many of the Manager screens allow you to select objects where a particular property has been assigned, including:

- Traffic flows
- Activities
- Train services
- Barrier adjustments

This can be useful both for accuracy checks and for changing assignments.

OBJECT PROPERTIES WINDOW

The object properties window can be opened by double-clicking on any object in the graphical display, by clicking the **Edit current selection** button in the toolbar, by selecting **Edit, Current selection** from the menu, or by the shortcut key **Ctrl+E**.

It will remain open and can be positioned at any convenient place on the computer display. Its appearance will change according to the type of object selected. When multiple objects are selected, the display will change so that common properties are shown. If the objects are of different types, then you will be limited to moving the objects.

The object properties windows are described in the section of this manual that deals with the particular type of object.

MOVING OBJECTS

You can move a selected object, or a collection of selected objects, by entering Move mode (click on the elbow-shaped button in the tool bar or right-click the mouse). You can then drag with the mouse. For large or precise movements, the **Edit**, **Edit Object Co-ordinates** function may be better. This also allows you to scale and rotate the model.

When two objects are connected in a chain, they remain connected when you move the common point, with their length stretching or shrinking as necessary. If you do not wish to move both objects, you must first break the chain as described below.

SPLIT OBJECT

NoiseMap contains a function that lets you divide line objects into two parts. Click on the object and choose **Edit**, **Split Object** from the main menu. The object will be split into two parts, with the height at the join being the average of the heights at the start and end of the original object. You will be asked if you wish to maintain consecutive ID numbering, which is useful, but take care not to be confused if this causes the ID numbers of other objects to change.

You can continue to apply the Split Object function to subdivide the object further, if required.

When an object has been split, the two parts remain joined in a chain. You can then use the move function to reposition the two parts of the object and they will hinge about the join. If you do not wish them to move together, then you must break the chain as described below.

Splitting ground contours

Where a ground contour is being split and the contour cross a road or another contour, then instead of being split into two

halves, it will be split at each point where it crosses the road or contour. This can be useful when tidying up ground models.

Hint: Copying objects
There is no dedicated Copy function in NoiseMap. One method of copying objects (within or between scenarios) is to save the object in a Shapefile and then to re-import it. You have to save all the objects of the chosen type that are loaded.

BREAK CHAIN

This function breaks the chain that links two objects so that the join can be separated by moving them with the mouse. You select the function from **`Edit`**, **`Break chain`**.

COPYING OBJECTS

There is no function to copy an object, for example to duplicate it within a scenario or to copy it to another scenario. If you need to copy an object to another scenario, one method is to save it as a Shapefile and then import it into the other scenario.

DELETING OBJECTS

You can delete all selected objects by pressing the **`Delete`** key. If you delete an object by mistake, you can usually recover it by selecting **`Edit`**, **`Undo`**. If you want to remove a whole area from the model, you could use the enclosure method to select all the objects within the area, and then press **`Delete`**.

If you only want to delete certain types of object, for example noise barriers, then you can go to the View Options dialogue and set the objects that you wish to retain either to Grey, or Off completely. Only the Full or bright objects can then be selected.

DELETE SELECTION

This deletes the selected object or objects. If the objects are joined in a chain, you are offered a choice of either

- Breaking the chain; or
- Moving the points each side of the split so that the chain is maintained. The new join will be at the centre of the deleted section.

Because contours are stored as a series of linked points, you can only select the points and not the links between them. Therefore, if you delete a point in the middle of a contour chain, unless you choose to maintain the chain, the objects *each side* of the deleted point will disappear.

UNDO AND REDO

UNDO

This will Undo the last deletion or move made **using the mouse on the graphical display**. ***Some operations cannot be undone.***

REDO

This reverses the previous Undo. (Dependent on the version, it may be possible to Redo up to four successive Undos)

NAVIGATING ALONG LINE OBJECTS

ROAD SEGMENTS

The segment editing window has forwards [> >] and backwards [< <] buttons to help you move along line objects. These behave slightly differently when you are in edit and add mode.

Editing existing segments

The graphical display shows you which segment the dialogue box is showing. As you scroll through, the segments will be displayed in roughly the order they were entered.

When a forward or backward button is pressed, any changes to the displayed data are applied before the next segment is displayed. To close the dialogue box, click **OK**.

Adding new segments

When you are entering properties for new segments, use the forward button to move on to the next segment. This will automatically inherit the properties of the previous segment, so you only need to change any properties which are not the same. When you have reached the end of the chain, the forward arrow will be greyed out. Use the **OK** button to close the window.

If you have selected one of the automatic height calculation methods from the Add menu, you should find that the start and end heights are already filled in correctly. If you have not selected automatic height calculation from the Add menu or if you have selected to Enter Manually from the DXF convert menu, you will need to enter data for each segment. As you move through the list, the start and end heights will be set to the last entered end height.

You may click **OK** at any time to close the editing window. Any remaining segments will automatically inherit the properties of the last highlighted object. This means that if all the objects in the chain have the same properties, you only need to enter the correct values for the first one. If you have chosen not to automatically generate heights, any remaining segments will be set to the last entered height.

If you use the backward button to move to a previous segment (e.g. to correct a mistake) any unedited segments will inherit the

properties of the segment nearest to them down the chain, not the currently-displayed values.

EDIT OBJECT CO-ORDINATES

This function allows the user to re-position, rotate, flip or re-scale selected objects in the model. Sometimes, a scheme drawing may be based on a different grid from the national grid, and this function allows the two grids to be aligned. It can also be used where a mistake is made with the scale of a drawing, or where the north direction has been entered wrongly. Only the selected objects will be altered. The shift (move) function of this command is also available from the Edit Current Selection window when multiple objects are selected.

Displacement

This shifts the model by the specified amount in the X or Y directions, or adds the specified amount to every height relative to the map datum. *Note that this does **not** change the heights relative to local ground.*

Rotation

Type in the angle of rotation that you require. A positive angle gives a clockwise rotation. The rotation takes place around the centre of the selected objects, or of the whole model, if no objects are selected, which is usually what you will require. [Rotation about the origin would 'swing' the model out of view.]

Hint: Rotation about other points
You can obtain rotation about any point by applying a displacement to bring the centre of the model to the co-ordinates of the rotation, and after rotating, reverse the displacement.

X-scale, Y-scale

These stretch the model about its centre (calculated from the most extreme points on any objects in the model). Thus, a scale factor of 2.0 in the X-direction would double the distance of all objects from the centre of the model (or centre of the selected objects) in the horizontal direction.

Flip in X-co-ordinates, Y-co-ordinates

This effectively reverses the direction of model on the chosen axis. The model is flipped about its centre. Thus, an object which ran from north to south will run from south to north after flipping in the Y-direction. This effectively creates a mirror image, so it is not the same as a rotation, as the orientation of the other axis is unaffected. (Flipping on both X and Y directions is equivalent to a 180-degree rotation.)

MEASURING TOOL

The measuring tool can be started by clicking its toolbar button or by selecting **`Edit, Measure tool`** from the menu. The measure tool shows:

- Current cursor position (in model co-ordinates)
- Delta x, y (change of model co-ordinates of cursor position in metres from point last clicked)
- Length (distance in metres) of cursor position from point last clicked
- Angle (of cursor position from point last clicked)
- Path Delta x, y (change of cursor position from first point clicked)
- Path length (distance of cursor from start, going through all the points clicked)

Pressing the **Esc** key deletes the last point clicked (ie backtracks along the path).

Right-click to reset the measure tool. Click on the Select arrow in the toolbar to exit from the measure tool.

CONTOURS

GROUND HEIGHT AND GROUND TYPE

The contour data is used to supply two objects:

- Ground height
- Ground type

GROUND HEIGHT CONTOURS

Ground heights can either be:

- contours denoting a line of level height
- profiles of earthworks, etc. which vary in height along their length

You can import ground contours from a variety of digital ground models (see the Index to find further details), but sometimes you may want to add or edit them manually.

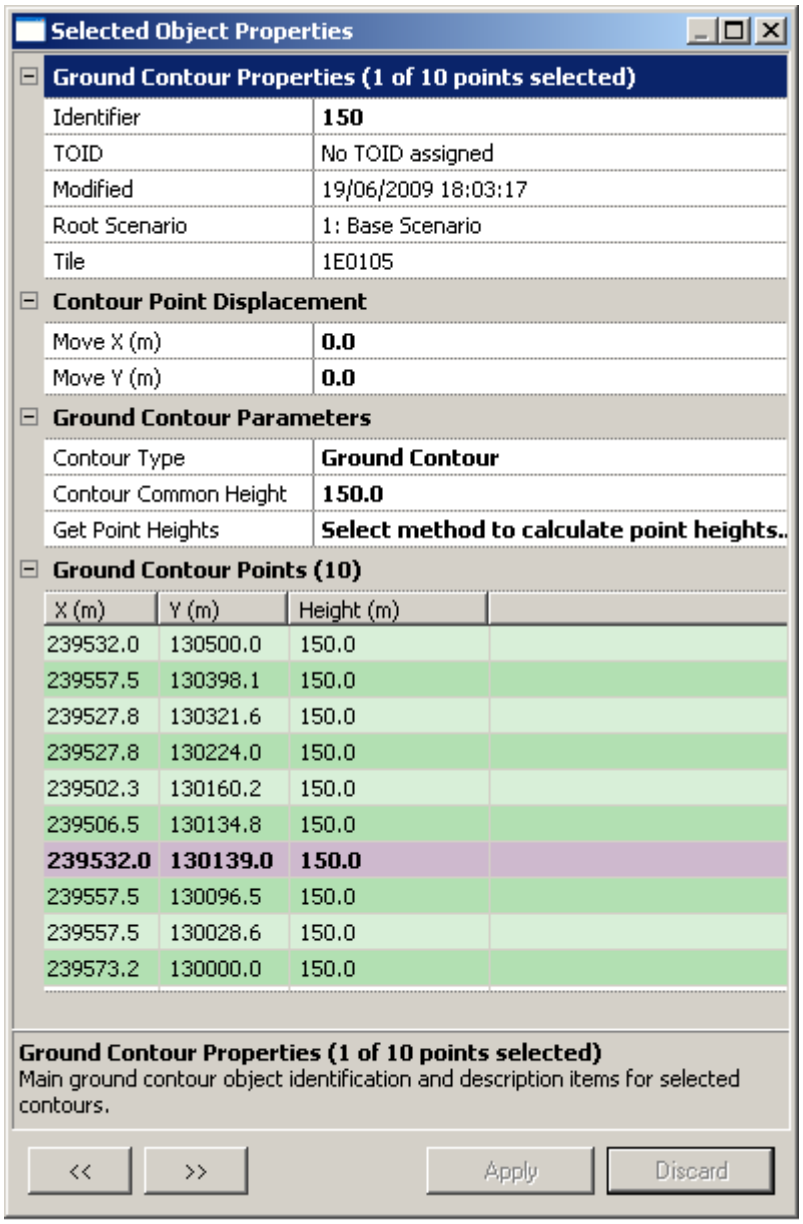
Adding ground contours or profiles manually

To add a ground contour or profile manually, select Add New Object from the Edit menu, or click the green + button on the toolbar. The shortcut is **Ctrl+A**. Select Ground Contours from the list and click **OK**.

Note that if you require *NoiseMap* to get the height of ground contours automatically, this can only be done when you first add them, by selecting **Automatically Generate Height** in the Add Object dialogue.

Click with the mouse at the position of the first point of the contour, then move to the next point and click again. Continue until you have reached the end of the contour. If the contour is to form a complete loop, press Shift and then left click to complete the loop.

Press **Escape** to remove the last added point. Right-click when you have completed the chain of points. The Ground Contour Properties dialogue will open and all the points in the chain you have just entered will be selected. They will be displayed in the list at the bottom of the dialogue box and will all be highlighted (shown in purple). At this point, if it is a level contour, enter its height into the Contour Common Height box and click **Apply**. This height will be assigned to all the points in the chain. However, if it is a profile of varying height, then use the mouse to select the first point in the chain. It will be highlighted in purple in the list. Enter the appropriate height and then use the forward and backward arrows at the bottom of the dialogue box to move along the chain and enter the appropriate height for each point in the height list.



Ground height contours

GROUND TYPE OUTLINES

Ground Type

When propagated over soft ground, noise is attenuated to a greater degree than would be expected by distance alone. *NoiseMap* will assume that all ground is soft, eg grass, gardens, cultivated fields, belts of trees, etc unless either

- the default ground type is changed in the road segment model data; or
- a particular area of the model is outlined as hard

Note that it is also possible to define an area as soft, where the default ground type has been changed to hard.

Such areas of hard or soft ground type are outlined in a series of straight lines which must enclose an area, ie the end must join back to the start. Such outlines must not cross a road, but they

may butt up to it. The outline should be marked in clockwise order and the ground type is that enclosed within the outline.

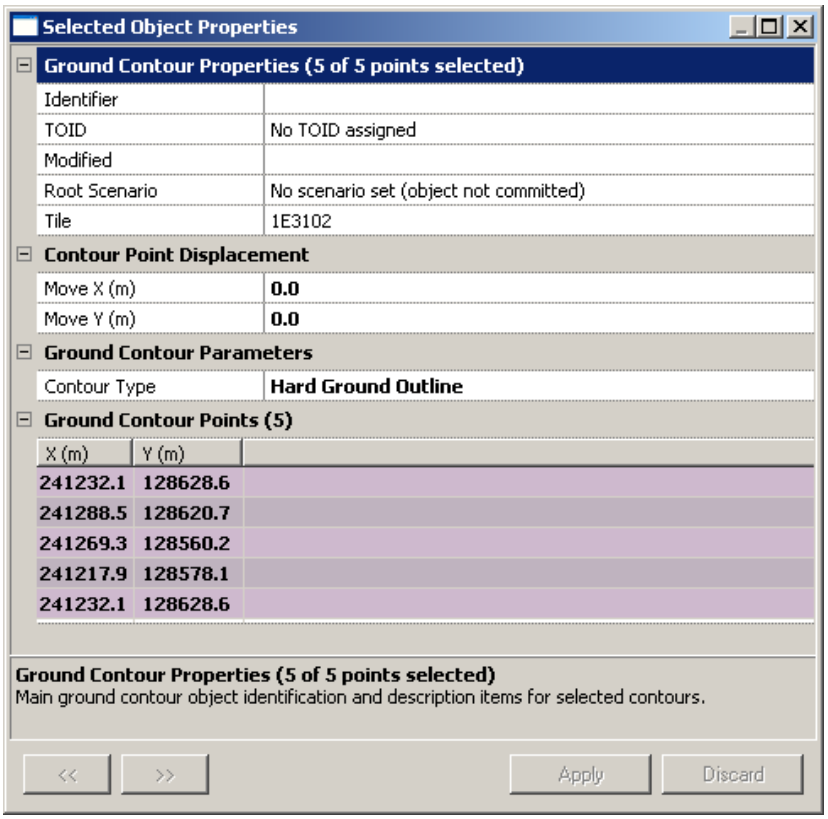
You can import ground type outlines directly from digital maps, but sometimes you may want to add or edit them manually.

Adding ground type outlines manually

Adding a ground type outline manually is a similar process to adding ground height contours. Select **`Add New Object`** from the **`Edit`** menu, or click the green **`+`** button on the toolbar. The shortcut is **`Ctrl+A`**. Select Ground Contour from the list and click **`OK`**.

Click with the mouse at the position of the first point of the contour, then move to the next point and click again. Continue until you have reached the end of the outline. Outlines should form a complete loop: press Shift and then left click to complete the loop.

If you position a point incorrectly, you can press Escape to remove the last added point. Right-click when you have completed the chain of points. The Ground Contour Properties dialogue will open and all the points in the chain you have just entered will be selected. They will be displayed in the list at the bottom of the dialogue box and will all be highlighted (shown in purple).



Ground Type Outlines

Setting the Ground Type

You should now indicate whether this is a hard or soft ground outline by clicking in the space opposite Contour type and choosing from the drop down list either:

- Hard Ground Outline ; or
- Soft Ground Outline.

This will be applied to all the points selected in the list, as the ground type must be the same at all the points in the list.

SPOT HEIGHT CHAIN

Spot heights are a classical method of indicating heights on maps. They consist of a position marker (usually a dot or a cross) with a label indicating the ground height at that point. Classically, spot heights were marked along roads, often positioned at junctions, but they do not provide any information on ground levels between the markers. This means that you would not normally want to join them permanently in the form of a ground contour, but you may still wish to use them to obtain ground heights if they are only height information available in the locality. *NoiseMap* lets you join them temporarily in a spot height chain, which can then be used as a temporary means of obtaining the heights of other objects, such as roads and ground contours. Note that Spot height chains are not stored in the model, they are only available temporarily, and when you create a new one, the old one disappears.

Creating a spot height chain

Select **`Spot height chain`** from the **`Add Object`** menu and click OK. Having decided the order in which you wish to 'join' the spot heights, click on them in turn. When you have completed the chain, right click to terminate. You will be presented with the Spot Height Point Properties dialogue and the first point in the chain will be selected. Enter its height in the box, then use the forward arrow to move to the next point, enter its height and continue until you have entered a height for each point. You may then wish to check back along the chain, because once you have clicked OK, the points can no longer be edited. When you are sure that the heights are correct, click OK. You may now choose to use the spot height chain to get the heights of objects that you add. Note that *NoiseMap* assumes that the ground slopes steadily between the points on the spot height chain.

Closing a spot height chain

The spot height chain will close as soon as you choose to enter another one – you can only have one chain present at any one time. To close a spot height chain, select to add another spot height chain and the original one will close.

BARRIERS

Interruptions of the noise propagation path have a major effect on noise levels. Such interruptions can occur in many ways, but the principal effects are caused by ground features (which can be natural or built forms), buildings and various forms of noise screening walls, fences or panels.

In *NoiseMap five*, the potential noise screening of ground features and buildings is automatically considered and so these should not be entered separately as noise barriers. Only noise screening walls, fences and panels need to be entered specifically as noise barrier objects. It is often necessary to test the effect of varying the height of a noise barrier, and *NoiseMap* has a feature that allows the height of noise barriers to be temporarily adjusted for this purpose.

The total number of barriers that can be accommodated in *NoiseMap five* is practically unlimited. For further information, see the specification for your version. You can specify the initial number of barriers when creating a noise model, but this is only for initial memory management and will be automatically expanded as required, see p 18:4.

You can import noise barriers from a variety of digital ground models (see the Index to find further details), but sometimes you may want to add or edit them manually, as described below.

Adding barriers manually

To add a noise barrier manually, select **Add New Object** from the Edit menu, or click the green **+** button on the toolbar. The shortcut is **Ctrl+A**. Select **Barriers** from the list and click **OK**. *[If Barriers are greyed out, then they have been set to 'Grey' or 'Off' in the Display Options menu.]*

Note that if you require *NoiseMap* to get the height of noise barriers automatically as you create them, this can be done by selecting **Automatically Generate Height** in the Add Object dialogue. The drop-down list offers a number of ways of getting the barrier height, depending on what height data is available in the model. Normally, you will choose base the barrier height on the *NoiseMap* ground model. Usually, you will also want the barrier to be at a certain height above ground level, so enter this amount in the box labelled 'Additional height to be added.' See the index for other ways of obtaining heights. Click **OK** and the cursor will change to cross-hairs to indicate that you are in **ADD** mode.

Click with the mouse at the position of the first point of the barrier, then move to the next point and click again. Continue until you have reached the end of the barrier. If the barrier is to form a complete loop, press Shift and then left click to complete the loop.

If you make an error when adding a point, press **Escape** to remove the last added point. Right-click when you have

completed the chain of points. The Multiple Barrier Properties dialogue will open and all the points in the chain you have just entered will be selected. At this point you can enter any properties that apply to all the barriers in the chain, as follows.

Make the changes you require and then click apply to apply the parameters to the chain of barriers you have just entered.

Object position parameters

When multiple barriers are selected, the co-ordinates and heights of individual barriers is not shown. Instead the dialogue contains a section headed Object position and displacement. Any values entered here will move the barrier by the corresponding amount in the X, Y and Height directions. This would be a good way of adding a given amount to the height of all the selected barriers, for example.

When an individual barrier is selected (usually by clicking on the graphical display) then properties of the individual barrier are shown. These include the following:

ID Number

NoiseMap will automatically number the barriers consecutively from 1.

The barrier ID number acts as a label for reference purposes on plots and on printouts, but is not used in any computation. Usually the automatic numbering is sufficient but you could assign any convenient integer of up to six digits as the barrier ID number, perhaps if you wanted to adopt some convention in the numbering system, such as roadside barriers starting at 1000, housing at 2000, etc.

Identifier

This is a label to describe the barriers, eg *Screen for haul road*.

TOID, Modified, Root Scenario

This is non-user editable information about the object.

Tile ID

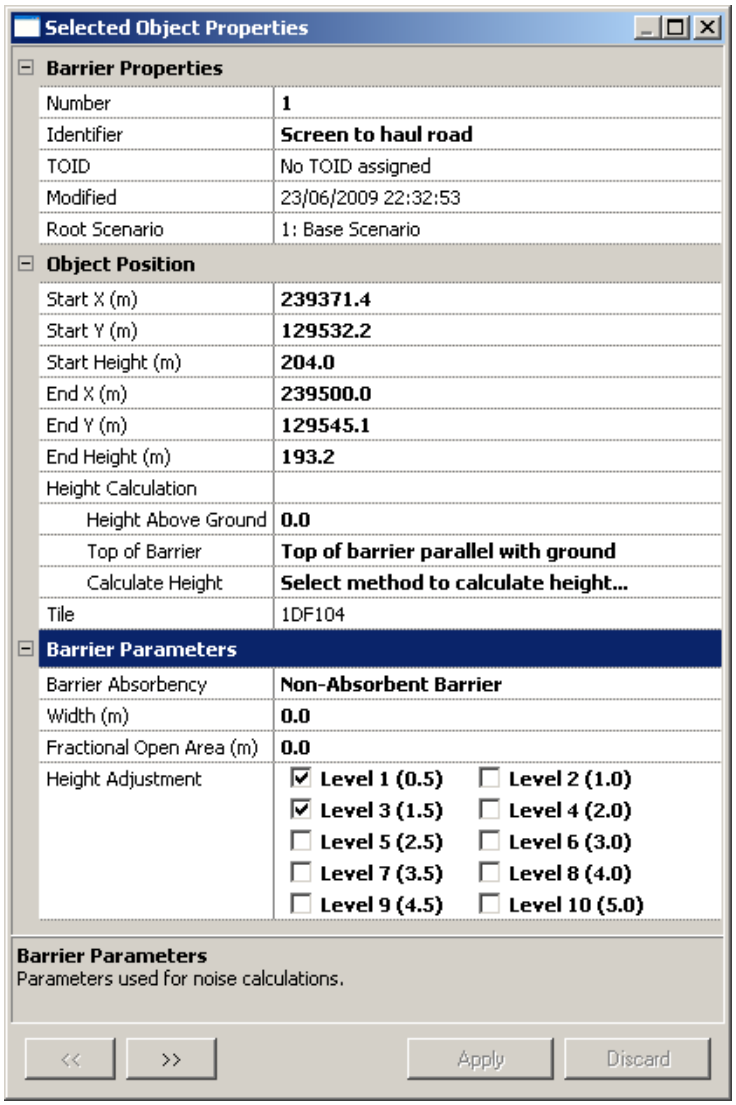
This identifies the tile to which the barrier point belongs

Start coordinates X = Y =
End Coordinates X = Y =

You can manually adjust the position of a barrier by typing new values into the object position boxes.

Start Height
End Height

The height value is the height of the start and end of the barrier above **ordnance datum**, not local ground. The heights should be entered to an accuracy of 0.1m if possible.



Single barrier properties screen

Height above ground

This gives the height of a barrier above the local ground. However, it is not currently stored: it is only used when performing a height calculation as described below.

Height calculation

NoiseMap will automatically calculate the height of the top of the noise barrier. You enter the height above ground for the top of the barrier, and select whether the top of the barrier is to be parallel with the ground or to be horizontal, with the average height of the two ends at the required height above local ground level.

From the drop-down list, you then choose the method of obtaining the height of the ends of the barrier, and click Get Height. The methods of obtaining the height will depend on data available in the model. The most common method is to get the height from the *NoiseMap* ground model (ie ground contours). You may also be able to use an OS Landform Grid model if loaded, or from a Spot Height chain.

Barrier Width

By entering a value other than zero, *NoiseMap* will interpret the barrier as having a flat-top with the specified width in metres. This results in the effective height of the barrier being increased, above the physical height specified with the start and end coordinates. On plan the barrier will still be interpreted as a line, running from the start to the end co-ordinates specified.

Overhang width

This parameter is currently only used in *RailNoise* calculations, and is the distance by which the top of the barrier overhangs from the baseline of the barrier towards the railway. **This parameter is ignored for road and site calculations.**

Fractional open area

A discontinuous barrier, for example a row of houses, can be entered as a single barrier with a proportion of open area. If the response to this prompt is, say 0.2, *NoiseMap* will interpret this as a specification that 20% of the barrier length is open. The graphical display will show a fractionally open barrier with a dashed line. In calculating the noise attenuation *NoiseMap* will assume that the proportion of the barrier that is open will be subject to soft ground excess where the ground type specification makes this appropriate.

Absorbency

This allows barriers to be denoted as either absorbent or non-absorbent (reflective) for noise. The effect of absorbency on calculations depends on the relevant calculation method (CRTN, CRN, BS5228, etc). These currently do not use intermediate values of absorbency as this leads to spurious accuracy because the effect of reflections from barriers is not large in most cases.

HEIGHT ADJUSTMENT *(Adjustable layers)*

This allows you to apply an increment to the height of this barrier when you commence a calculation, without permanently changing the height of the barrier. This is very useful when you are trying to optimise barrier heights to achieve particular design goals.

NoiseMap has ten height adjustment layers, labelled Level 1 to Level 10, that can be applied to the selected barrier. Each one of these adjustment layers adds a set amount to the height of the barrier. The amount of adjustment applied by each layer is set in the **`Parameters, Edit barrier Adjustments`** window. The current settings are shown in brackets after the Level number. The adjustment is a temporary correction which is only applied whilst the calculation is run. Tick the combination of layers you wish to apply to the barrier (or none at all).

Chaining Barriers

Barriers, like road segments and contours, are frequently entered as a series of straight lines approximations chained together.

RECEIVERS

Receivers are specific points at which you require a noise calculation, as distinct from noise contours which show noise levels across an area. The calculation options and procedures for Receivers are detailed in Chapter 11 "Calculation at individual receivers."

SAVING CHANGES

When you have made changes to a noise model, you will wish to save them. Normally, you will save the changes to the database, either as a change to the existing scenario that you are currently using, or to a new scenario, thus leaving the existing scenario unchanged. You cannot save the changes into a different scenario that already exists.

To save the changes to the database, select **File**, **Commit changes** from the menu bar. This will open a dialogue box asking you to select the scenario to commit the changes to:

- Current scenario
- New child based on current scenario

If you choose to save to a new 'child' scenario, then a further dialogue box will ask for:

- Scenario name
- Scenario number (you would normally accept the number offered by the system)
- Description of scenario

When the changes are saved to a new scenario, only the differences between the two scenarios are saved. If changes are later made to the parent scenario, then those changes will also be seen in the child scenario.

The exception to this rule is where an object has differences between the parent and child scenarios. (For example, the object may have a different height or may have been deleted entirely in the child scenario.) In such cases, a change to the object in the parent scenario will not affect the properties of the object in the child scenario. Changes to objects in the child scenario will *never* affect the parent scenario.

CONFLICT CHECKING

It is possible that two users may start editing the same area and same scenario at the same time. This is no problem as long as they do not modify the same object. However, if they modify the same object, there is a conflict as to which user's changes should prevail. *NoiseMap* recognises this conflict and only saves the changes made by the first user. The second user is warned of the situation so that they can take action if necessary.

OPTIMISE DATABASE

When a large number of changes have been made to a database, its indexes can become fragmented and the tables can contain a large amount of redundant data. This makes the database bigger and slower than it needs to be. The **`Files`**, **`Optimise Database`** function cleans up the database so that it is smaller and can be searched more rapidly. It also removes blank tiles from scenarios, e.g. where all the objects in a tile have been deleted. This reduces blank tiles in the display when resetting the view of a scenario.

You only need to undertake an optimisation after you have made a large number of changes to the database. It does take some time to execute on a large database.

6. ROAD NOISE MODELLING

STARTING THE SOFTWARE

Before you start creating a road noise model, you will need to create a database as described in Chapter 4 of this manual.

If this database already contains the geographical data (for example, it already has a site or rail noise model in it), then you can proceed to add traffic flow data and road segments as described in the following sections of this manual. If not, then create the geographical model in one of the many ways described in this manual. You may find it useful to create the ground model (ground height contours) first, as the height of other objects can then be taken from them. If you are entering road segments manually, you may find it useful to enter the traffic flow data next, as you can then assign the traffic flows when you add each road segment. However, you can add segment heights and traffic flows later if this is more convenient.

TRAFFIC FLOW DATA

There are three main ways of entering traffic flow data:

- Manually, using the Traffic Flow dialogue box;
- Importing from a spreadsheet;
- Importing as part of the roads shapefile.

When entering traffic flows manually, it may be convenient to do this before entering any road segments, as this will make it easier to assign the correct traffic flows to the segments. If you do this, then you will need to download all traffic flows as described below, otherwise flows not already assigned to segments will seem to have disappeared.

CRTN rules for traffic flow data

There are detailed rules in CRTN about traffic flow data, which should be observed. The most important is that speeds **must** be between 20 km/h and 130 km/h. However, *NoiseMap* will use a speed of 20 km/h if you enter a value of less than that. Speeds are normally to be taken from the table of prescribed speeds at para 14.2 of CRTN.

24 × 1-h flows

Two major changes in noise assessment methodology have taken place in the last few years. The first of these is the calculation of L_{den}, required by the EU Environmental Noise Directive, which requires calculation of noise over a 24-hour period and over day,

evening and night periods. The other change is the introduction of traffic management, including speed and lane control, on congested routes. This means that previous assumptions about the daily traffic profile – the variation in traffic flow over a 24-hour period – may not be appropriate in some cases.

In order to assess these cases accurately, it may be desired to calculate noise levels based on the traffic flow parameters in the day, evening and night periods, or indeed in each hour of the day. *NoiseMap five* provides for such assessments to be carried out easily.

You can enter

- 18-hour,
- 1 hour,
- day/evening/night and
- 24 by 1-hour traffic flow data.

All the traffic flows must be on the same time basis in any one scenario, eg all 18-hour flows or all 24 × 1-h flows, although different bases can be used in different scenarios.

Loading all traffic flows

Normally, for speed, *NoiseMap* only downloads traffic flows that have already been assigned to road segments before ending the modelling session. Other flows not assigned to road segments will seem to have disappeared. However, you can force *NoiseMap* to download all traffic flows automatically when you connect to the scenario, by going to **`Parameters`**, **`Program Options`**. Select the **`Model Loading`** section and under Traffic Flows, select 'Load all traffic flows in model'.

Alternatively, you can download all traffic flows at any time by selecting **`Parameters`**, **`Load all traffic flows`**

CHANGING TRAFFIC FLOW DATA

A very common requirement of Road Traffic noise modelling is to test the effect of different traffic flow situations. For example, you may wish to test the difference in noise levels between opening year and design year, or between alternative scheme options.

NoiseMap is designed to simplify this process by keeping the traffic flow table separate from the road segment information, and linking them by a traffic flow reference number (called a Flow ID in *NoiseMap*) rather than entering the traffic flow values directly as part of the road segment data.

This allows you to replace the whole set of traffic flow values with different ones where necessary, without having to edit the road segment information. You can change the traffic flow values by manually editing each one in the traffic flow dialogue box,

but this could be slow and tedious if many values have to be changed.

Alternatively, if you have the traffic flow data in spreadsheet or ASCII file format, you can easily import the spreadsheet or ASCII file, which will then update all the traffic flows. Both options are described in the following sections. The file-import method can be automated using the scripting interface, see the index for references.

When you change a traffic flow parameter (such as a flow rate, % heavy, speed or speed basis) then that new value applies to the scenario you save it to, and its child scenarios. It does not affect any values in the parent scenario.

For example, if you are working in the Base Scenario, you can import the new traffic flows and save them to a new scenario called, for example 'Design Year', which will be identical to the Base Scenario except for the different flows.

Each traffic flow can have a name as well as a Traffic Flow reference ID number. If you change the name of the traffic flow, the new name will appear in all scenarios, because each Traffic Flow reference ID number has the same name throughout the database: you cannot have different flow names in each scenario although you can have difference flow values.

If you change the Flow ID, this *creates a new traffic flow*, with the flow values that were already assigned. Because this is a new flow, its parameters will be the same in all scenarios from the base scenario onwards, unless a value is subsequently changed.

MANUAL ENTRY USING THE TRAFFIC FLOW DIALOGUE BOX

You add or change traffic flows using the Traffic Flow dialogue box. To open this from the main menu, select **`Parameters`**, **`Edit Traffic flow`**.

Adding traffic flows

When you start a new scheme, no traffic flows will have been entered. You must firstly click **`Add Flow`**, to open the **`New Traffic Flow`** dialogue box. Here, you will be requested to add the following information:

Flow ID

The Flow ID is a reference number for the traffic flow. Its main purpose is to link the traffic flow data to particular road segments. *NoiseMap* will offer the next Flow ID number in the sequence. If you want a different ID number, type the number into the **`Flow ID`** box. If you choose a flow ID that is already in use, you will get a warning and must choose a different ID.

The flow ID can be up to 9 digits long, i.e. up to 999999999.

Flow Text

This is a name or description for the flow (eg a road name). Examples are:

```
CORONATION STREET, YEAR 2015
```

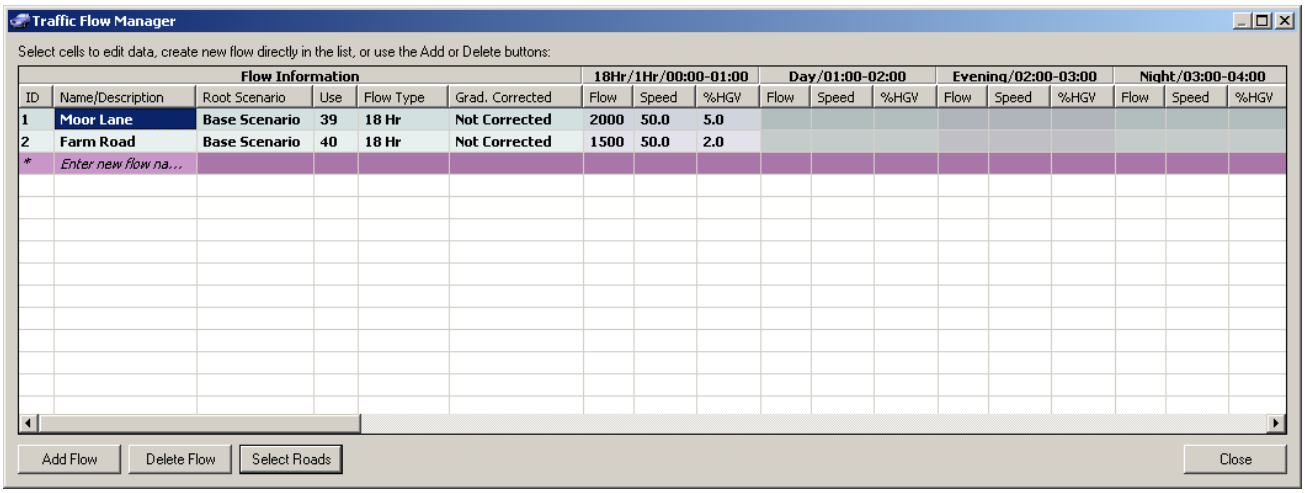
Or

```
RAMSEY STREET, YEAR 2003
```

Press **TAB** to move onto the next entry column.

Adding flow data

You can now add the flow data in the boxes on the dialogue box:



Traffic Flows dialogue box (part)

Flow type

Choose the type of flow data that you wish to enter from the drop-down list, which is as follows:

- 18-hour;
- 1-hour;
- D/E/N (Day/Evening/Night);
- 24-hour.

If you choose 18-hour or 1-hour, then this goes in the first three traffic flow columns.

If you choose Day/Evening/Night, enter values in the second, third and fourth traffic flow columns (for certain L_{den} calculations, you will also need to add an 18-hour value as well)

If you choose 24-hour, then you use all 24 traffic flow columns.

18 hour or 1 hour

These buttons apply when you have chosen to enter generic CRTN/Leq traffic flows. Click the appropriate button.

Please see also the advice[1] on the ROI (NRA) methodology if you wish to use the Irish method, as both Methods A and B can usually be calculated from the 18-hour traffic flow.

Corrected for gradient

If the traffic speed for a particular road has been directly measured, or estimated by the highway authority, the user should check this box. This response instructs *NoiseMap* not to make any correction to the traffic speed as a result of road gradient, as the correction is already implicit within the mean speed value. If, as is more usual, the traffic speed was taken from the table in CRTN Para 14.2, this box should not be checked, and *NoiseMap* will make the appropriate correction for the effect of gradient on traffic speed.

Flow rate

This is the total traffic flow over the time period that you selected in Flow Type.

For a one-way road, this refers to the number of vehicles travelling in one direction. For a two-way road, the vehicle flow is the sum of the vehicles travelling in both directions, except where the two carriageways are effectively separated (ie the road segment type is **Dual Carriageway**). If the two carriageways are separated by more than 5 m horizontally or the heights of the outer edges of the two carriageways differ by more than 1 m, the value to be entered should be half the value for the two-way flow. (The details of the road will be added later).

Traffic census data which has been collected over a 16-hour period can be converted to an 18-hour flow value by adding 5 % to the 16-hour value.

Speed

This is the mean speed of the traffic flow, in kilometres per hour. 'Calculation of Road Traffic Noise' gives in Para 14.2 a table of values to be used depending on the road classification. In most circumstances, these values should be used, without any correction for road gradient. *NoiseMap* will automatically make the appropriate correction.

% heavy vehicles

The value entered here is the average of the percentage of heavy vehicles (ie vehicles exceeding an unladen weight of 1525 kg) for each hour in the 18-hour period. If a traffic flow for a 1-hour period has been entered, the percentage of heavy vehicles should related to the same hour. No percentage sign should be entered.

Root scenario

This shows the name of the scenario where the current parameters of the traffic flow were entered. This is for information and cannot be edited by the user.

[1] Implementation of NRA (Ireland) Method for Calculation of L_{den}. Technical Advice Note. Atkins May 2008.

Use

This column shows how many segments use the selected flow. This is for information and cannot be edited by the user.

Select Roads

You can select all the segments using the selected traffic flow by clicking the **`Select Roads`** button. All the road segments using the flow will be shown with dotted outlines in the graphical window and can be edited together, for example to assign a different traffic flow.

IMPORTING TRAFFIC FLOWS FROM A SPREADSHEET

You can import traffic flows from a spreadsheet or plain ASCII file that is saved in CSV (comma-separated values) format. Select **`Parameters`**, **`Import Traffic Flows`** from the menu and navigate to the file.

The first line of the spreadsheet can contain a heading describing the columns to aid readability, but you cannot use the heading to change the column order or to omit columns. The spreadsheet **must** be laid out as shown below.

FLOWNUM	NAME	TYPE	CORRECT	FLOW0	SPEED0	PHGV0	FLOW1	SPEED1	PHGV1	FLOW2	SPEED2	PHGV2	FLOW3	SPEED3	PHGV3	FLOW4	SPEED4	PHGV4
1	Moor Lane	24HR	0	210	50	15.6	133	50	21.3	95	50	26.8	83	50	33.1	93	50	44.1
2	Farm Road	24HR	0	84	50	2.6	53	50	3.6	38	50	4.5	33	50	5.5	37	50	7.4
3	Barnwell Av	24HR	0	25	50	2.6	16	50	3.6	11	50	4.5	10	50	5.5	11	50	7.4

Traffic flow import format

FlowNum is a user-assigned flow ID number of up to 9 digits. If this Flow ID is already present in the traffic flow data, then the existing traffic flow values with that ID will be replaced by the new values from the spreadsheet. This gives an easy way of updating flows between scenarios. If the flow ID is not already present, it will be added to the database.

The flow **name** given in the spreadsheet will **replace** any flow name for that flow number already in the database, and this name will apply to all scenarios.

Type indicates the period(s) covered by the flow data, and can be 24HR, 18HR or 1HR or DEN. Note that in any one scenario, the flows must all be of the same type – you cannot mix them.

Corrected indicates whether the speed is corrected for gradient. A value of 0 means it is not corrected for gradient and a value of 1 indicates that the speed is corrected for gradient. For more information on these settings, see the preceding section on Manual Data Entry.

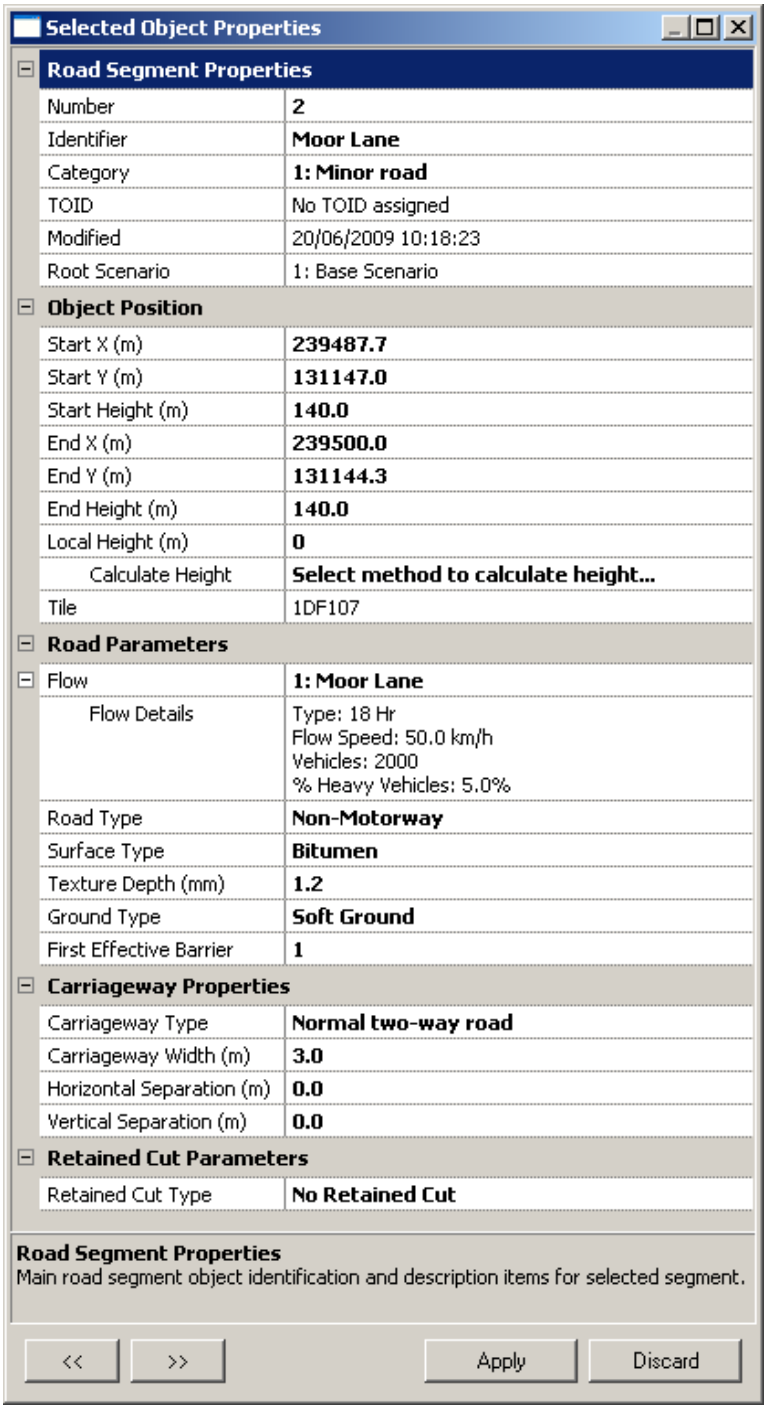
This column is then followed by up to 24 periods of flow data. For each period, the flow rate, speed and percentage of heavy vehicles are given as follows.

For 1 hour or 18-hour data, period 0 must be used. For Day, Evening and Night, periods 1, 2 and 3 must be used (**note**: calculation of Lden requires the 18-hour value as well as the

d/e/n values to be given). For 24-hour flows, use all 24 periods from 0 to 23. Period 0 represents the hour 00:00 to 01:00, period 1 represents 01:00 to 02:00, and so on up to period 23 which represents 23:00 to 24:00 (midnight).

SEGMENTS

The properties of individual road segments can be edited by selecting the segment. If the properties window is not already open you can open it by double-clicking on the object or by clicking on the **`Edit Properties`** button in the toolbar.



Road segment properties

Where there is a range of options for a particular parameter, a drop-down list is shown, from which you can select the required value.

ROAD SEGMENT PROPERTIES

Number

This is user-chosen numerical value to identify the segment. *NoiseMap* maintains its own internal identifiers which are not user-editable and are not normally shown.

Identifier

This is a user-chosen text label, such as the road name.

Category

Select an appropriate category for the road segment from the drop-down list. All segments must be assigned to a category in order for the contribution from the segment to be included in receiver and noise contour calculations. See page 4:38.

TOID

This is a universal object identifier which is not user-editable. It is usually assigned when the object is imported from an external data source.

Modified

This is the last time that the properties of this segment were modified in the database, and is provided for information only.

Root Scenario

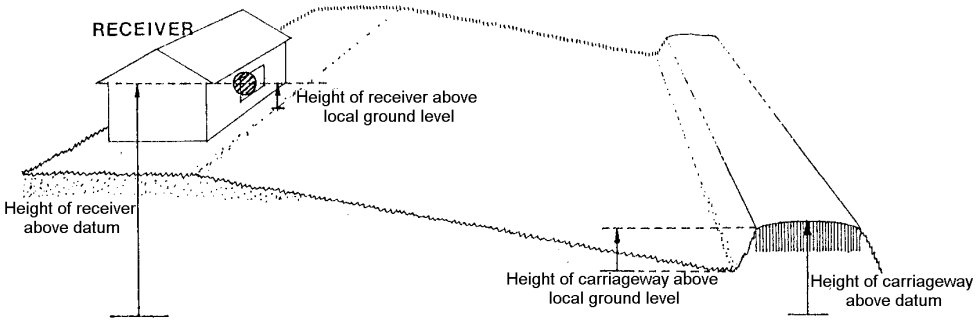
This is the scenario where the current properties of the object were entered. It is provided to assist in tracing the inheritance of the properties of the object.

OBJECT POSITION

These are the 3d co-ordinates of the start and end of the segment.

Heights

Heights can be assigned in a variety of ways. Usually, they will be imported from the Shapefile or DXF file, or they are obtained from the ground model. To get a height automatically, Click **`Select Method to get height`**. The drop-down list will show the range of options available at the present time. Select the required method with the mouse and click. The height will be calculated using the chosen method and the height above local ground (set in the Local Height box) will be added to the local ground height. Positive values will put the road on a bridge or flyover, whilst negative values will put it into a cutting.



Heights

Local height

This is the height of the carriageway above local ground level, not at the start of the segment, but at the centre of the segment length. If the segment is in a cutting, the value will be negative.

This item is used when the ground contours between the segment and a receiver point are not specified. *NoiseMap* will calculate the soft ground excess for that segment receiver combination on the basis of the average of the carriageway height above ground and the receiver height above ground. As this will only give an approximation to the actual soft ground attenuation, the use of this parameter is not generally recommended as an alternative to contours in critical situations.

Hint - Elevated roads

If the road is not at local ground level, then type the height above local ground level into the **`Local height`** *box. This value will be added to the local ground contour value when the road height is calculated. This has the effect of putting the road onto 'stilts', which will be seen in the 3D view. You should not normally use negative values to put the road into a cutting, as you must ensure that the ground contours correctly define the cutting.*

Tile

This is an internal identifier used by *NoiseMap* to indicate which map tile contains the road segment. If a road segment is moved, the tile number will change automatically if necessary.

ROAD PARAMETERS

Flow

Traffic flows are entered from the **`Traffic Flow Manager`** on the **`Parameters`** menu. When you have done this, you can select the appropriate flow from the drop-down list. The details of the selected flow are shown below the flow name, but cannot

be edited here. However, if you also open the Traffic Flow Manager, then the relevant flow will be automatically selected and you can edit it there. *Note: the traffic flow direction depends on the type of carriageway (single, dual or one-way), see Carriageway Properties, below.*

*[**Important Note**: if the Carriageway is of Type* **`Dual`***, the flow **must be half the two-way flow**, as it will be used separately for each direction.]*

Road type

This parameter is used in calculating L_{den} according to the Defra procedure. You may select either:

- Motorway; or
- Non-motorway

Surface type

This gives the type of road surfacing material:

- BITUMEN
- CONCRETE
- PERVIOUS
- CORRECTION = correction given in dB(A)

If the surface type is selected as **CORRECTION**, then the user can insert the correction in dB(A) to be applied, rather than letting *NoiseMap* calculate a value. The correction can be a positive or negative value – a low-noise surface would normally have a negative value.

Road texture depth

The user should enter the texture depth of the road surfacing material in mm. (This is the only case in *NoiseMap* in which a unit of length is specified other than in metres). The default is 1.5mm. Where the traffic speed is less than 75km/hr, or where a pervious surfacing is used, it is not necessary to supply a value in response to this prompt. If the surface type has been defined as a '**CORRECTION**', then the next prompt is shown, rather than this one.

Surface correction

This prompt only appears if the user has chosen a road surface type of '**CORRECTION**'.

This prompt is only there to enable the user to make other corrections where local circumstances make the departure from CRTN88 procedures appropriate.

The value should be the number of decibels to be added to the Basic Noise Level for this segment. This value will be used in place of the CRTN88 surface correction, and will not be adjusted for speed or other variations.

Ground type

By default, the ground surrounding the road is assumed to be acoustically soft. However, in some circumstances it might be desirable to change this to hard. Be particularly careful not to mix the ground type of segments in the same model, as this could result in inconsistency in the calculation of ground absorption. Note that areas of different ground type can be specifically defined with ground type outlines.

1st effective barrier

Occasionally, it is necessary for one or more barriers to be ignored for a particular segment. An instance of this would be where one road crosses another at high level. The upper road will have a parapet which needs to be modelled, but *NoiseMap* assumes that this goes down to the ground, thus screening the lower road, which may not be so. The parapet barriers can be ignored for the lower road by placing them at the front of the barrier file, then entering the ID number of the first barrier in the list to be included. Remember to set the number back to 1 for the next segment.

CARRIAGEWAY PROPERTIES

Carriageway type

The type of carriageway is chosen from the drop-down list, by clicking on its down-arrow. The choices are:

- Normal 2-way road = Normal two-way road; or normal dual carriageway
- One-way single road
- Dual carriageway = Two-way flow on two separated parallel carriageways

A normal two-way road configuration is assigned a type of **Normal 2-way road**, even if the road has a central reservation, provided that

- the central reservation has a width of less than 5m AND
- the heights of the outside edges of the two carriageways do not differ by more than 1m.

Where the central reservation exceeds 5m in width, OR the outside edges of the two carriageways differ in height by more than 1m, the carriageway type is **Dual Carriageway**. *NoiseMap* will then calculate the separate contributions from the two carriageways even though only one segment line has been entered. The traffic flow **must be half the two-way flow**, as it will be applied separately to each direction.

When a road is divided into two carriageways, and there is an effective noise barrier between the carriageways, then a **Dual carriageway** type cannot be used. Both carriageways must be entered separately, as two separate sequences of segments. Each

sequence should be treated as having a one-way flow, and therefore both sequences of segments have a type of **One-way single road**. (Remember also, that to specify the direction of traffic flow for each of the carriageways, the two sequences will have to be entered in opposite orders).

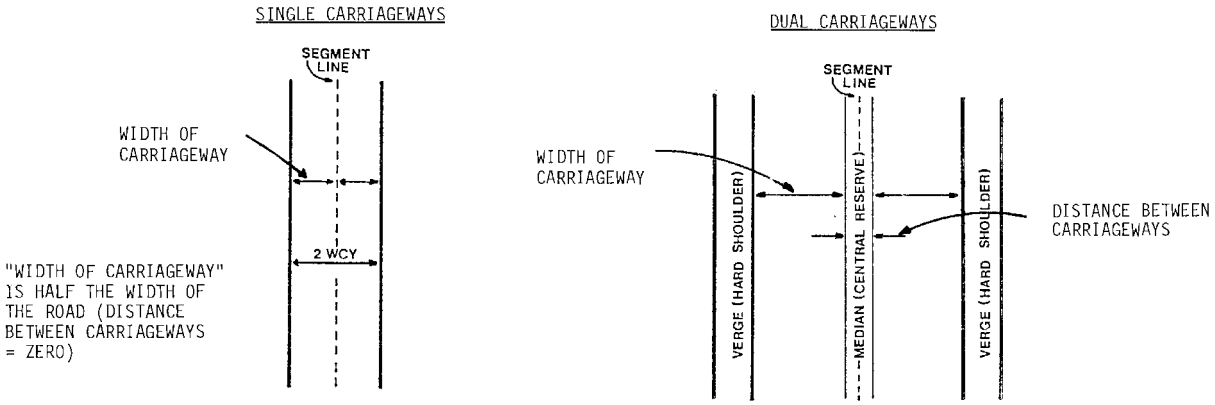
A road segment with one-way traffic flow is of type **One-way single road**.

Traffic flow direction

The traffic flow direction is not specified directly in *NoiseMap*, but is obtained from the segment properties. For **two-way flows**, the flow direction is immaterial, but for one-way flows, then a gradient correction is applied to the uphill flow, so the flow direction is important. When the carriageway type is set to **One-way**, then the traffic flow direction is taken to be from the start of the segment towards the end of the segment, and a gradient correction will be applied if this flow is uphill. If the segment has been entered in the wrong direction, you can use the **`Segment Tools`**, **`Reverse segment chain`** function *(shortcut ctrl-x)* to change the direction. For a Dual Carriageway with separate one-way flows in each direction, traffic is taken to drive on the left, so that if the left-hand carriageway (looking from the start of the segment and facing towards the end of the segment) is uphill, a gradient correction will be applied. In cases where traffic drives on the right, it is recommended that the two directions are entered as separate one-way flows.

Carriageway width

You need to put in the carriageway width. **Note that for a single carriageway, you enter the width of half the road.**

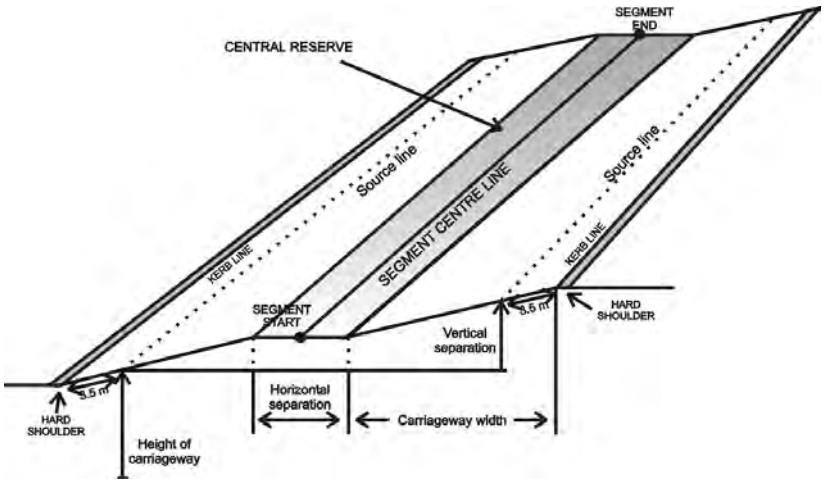


Carriageway Width

Obtaining Carriageway Width

The width for one-way and two-way single carriageway segments is half the total width of the road. For dual carriageway segments the value is the width of one carriageway. You can measure this width a scale ruler if you have the original plan.

Carriageway Separation



Carriageway Separation

Horizontal Separation

This box specifies horizontal separation between the two carriageways, ie the width of the central reservation. If the segment is not divided into two carriageways the value should be 0.0m. If the horizontal separation is greater than 5.0m, the road must be specified as a separated dual carriageway (ie the carriageway is type **Dual Carriageway**). If the horizontal separation is less than 5.0m (and the carriageways are not at different heights) CRTN88 requires that the segment be treated as a normal road with a two-way flow. Hence the carriageway type should have been specified as **Normal 2-way road**.

Note: the horizontal separation value is only shown when Dual Carriageway Type has been selected, but it will still be applied to single carriageways.

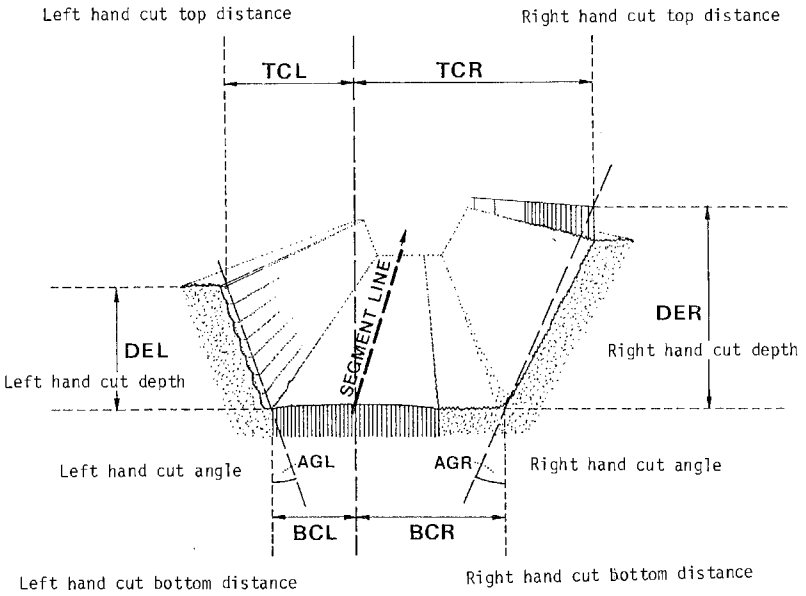
Vertical Separation

The value of the vertical carriageway separation is the difference in height between the effective source lines of the two carriageways. The effective source lines are 3.5 m in from the outer edges of their respective carriageways.

If the heights of the outer edges of the two carriageways differ by 1.0m or less, (and the carriageways are not separated horizontally by more than 5m) CRTN88 requires that the road be treated as a normal two-way flow road, and the carriageway type

should have been set at **Normal 2-way road**. If the heights differ by more than 1.0m, the carriageway type should be **Dual Carriageway**.

Note: the vertical separation value is only shown when Dual Carriageway Type has been selected, but it will still be applied to single carriageways.



Retained cut parameters

RETAINED CUT SETTING

If the road segment is in a cutting flanked on both sides by reflecting surfaces, inter-reflection will reduce the effective screening. Parallel acoustic fencing would constitute a pair of reflecting surfaces, as would a cut with near-vertical concrete walls. If the segment is within a retained cut or between parallel barriers the user should select YES. If it is not then NO should be selected.

- ☐ NO
- ☐ YES

Selecting **YES** will request information describing the geometry of the retained cutting or dual barriers.

The meaning of the parameters should be clear from the diagram below. Here, as elsewhere in *NoiseMap*, the left side is the side which is on the left when facing in the direction that the element (ie the road segment) is entered.

Absorbent surfaces

- ☐ NO
- ☐ YES

If there are absorbent surfaces within the cutting, either in the form of absorbent noise barriers, grassed or landscaped areas, select **YES** in this box.

Left hand cut - top distance (TCL)

The next four parameters relate to the details of the left-hand edge of the cutting. This parameter is the plan distance from the segment line, or centre line of the road, to the top left hand edge of the cutting, in metres.

Bottom distance (BCL)

This parameter is the plan distance from the segment line to the bottom left hand edge of the cutting, in metres.

Angle of left retaining wall (AGL)

This parameter is the vertical angle of the left hand retaining wall, commonly around 3°.

Depth of left retaining wall (DEL)

This parameter is the vertical depth of the left hand retaining wall, in metres.

Right hand cut top distance (TCR)

The next four parameters relate to the details of the right hand edge of the cutting. This parameter is the plan distance from the segment line, or centre-line of the road, to the top right hand edge of the cutting, in metres.

Right hand cut bottom distance (BCR)

This parameter is the plan distance from the segment line to the bottom right hand edge of the cutting, in metres.

Angle of right-hand retaining wall (AGR)

This parameter is the vertical angle of the right hand retaining wall, commonly around 3°.

Depth of right-hand retaining wall (DER)

This parameter is the vertical depth of the right hand retaining wall in metres.

When you have completed this screen, click **OK** to return to the segment properties page, and click **OK** again.

NEXT SEGMENT

At this point, all the data needed to define the segment has now been entered.

If you have entered a number of segments in a chain, and all the segments have the same properties (except for geographical position) you can click **Apply** and the properties will be assigned to all the selected segments. If you click **Discard**, then any changes you have made revert back to their previous values.

Alternatively, you can scroll through the segments by clicking the forward and backward buttons at the bottom of the dialogue box, or by keying **Shift +** → or **Shift +** ← . You will now be presented with the segments properties screen for the next segment. Proceed in the same way as for the first segment. You will notice that some of the properties are already filled in, since they have been 'chained' from the previous segment. You can edit these values as necessary.

7. SITE NOISE MODELLING

STARTING THE SOFTWARE

For an explanation of the structure of a *SiteNoise* model, including the plant list, the activity list, categories and scenarios, please see *Structure of a SiteNoise Model*, p 3:4

Before you start *SiteNoise*, you will need to create a database that is enabled for *SiteNoise*/ *RoadNoise*/ *RailNoise*. The current database administrator tool (v.0.9.10 or above) will do this. Old *RoadNoise*-only databases cannot store the information used by *SiteNoise* and *RailNoise*.

Start the software and connect to a suitable database in the normal way, as described in Chapter 4 of this manual.

If this database already contains the geographical data (for example, it already has a road traffic noise model in it), then you can proceed to add plant, activities and workings as described in the following sections of this manual. If not, then first create the geographical model, in one of the many ways as described in this manual.

ADDING PLANT DATA

Select **`Parameters, Plant manager`** from the menu and the **`Plant Manager`** dialogue will open. Click the **`Add Plant`** button or double click on the in the purple box reading ***`Enter new plant name or ID`*** … . You can now type a Name or Description for the plant in this box.

Source type

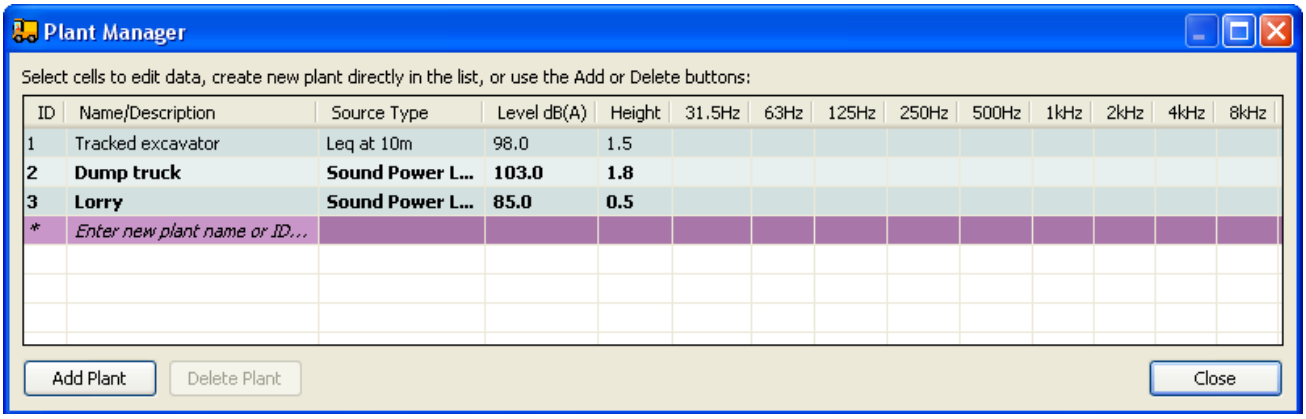
Then Tab to the Source Type box. Select the drop-down list in this box and choose:

- L_{Aeq} at 10 m; or
- L_{Amax} at 10 m; or
- Sound Power Level (A-weighted).

according to the source data that you have for this item.

Hint: Choosing source parameter. Sound Power Level is the preferred parameter as this is equally applicable to stationary or moving sources. For haul roads, do **not** use L_{Aeq} because this will not be be corrected for the number of vehicles or speed. L_{Amax} can be used, but ensue that it is a typical value and not an absolute maximum which could lead to over-prediction.

Then tab to the next box and enter the A-weighted L_{eq}, L_{Amax} or sound power level.



Plant manager

Height of source within plant

You also need to enter the height of the noise source **within the item of plant**. For a large piece of earth-moving equipment, this might be 1.5 m, for example. For a road-going vehicle, it might be 0.5 m. For a small item such as a fan, it might be 0 m. *Note that this is **not** the actual height of the item of plant in the noise model: that is given by the working location.*

Noise Spectrum

If you have the octave band noise spectrum of the plant, you can enter it in the nine boxes provided.

Repeat the procedure to add any number of additional items of plant.

Plant data and scenarios

Plant data is not fixed to a particular scenario. The same plant data will be available in every scenario that you create.

If you change the sound level of an item of plant, this will affect every scenario in which it is used. Therefore, if you want to substitute an item of plant for a quieter item so that you can repeat a calculation to see the difference it makes, you should add the quieter plant to the list as a new item.

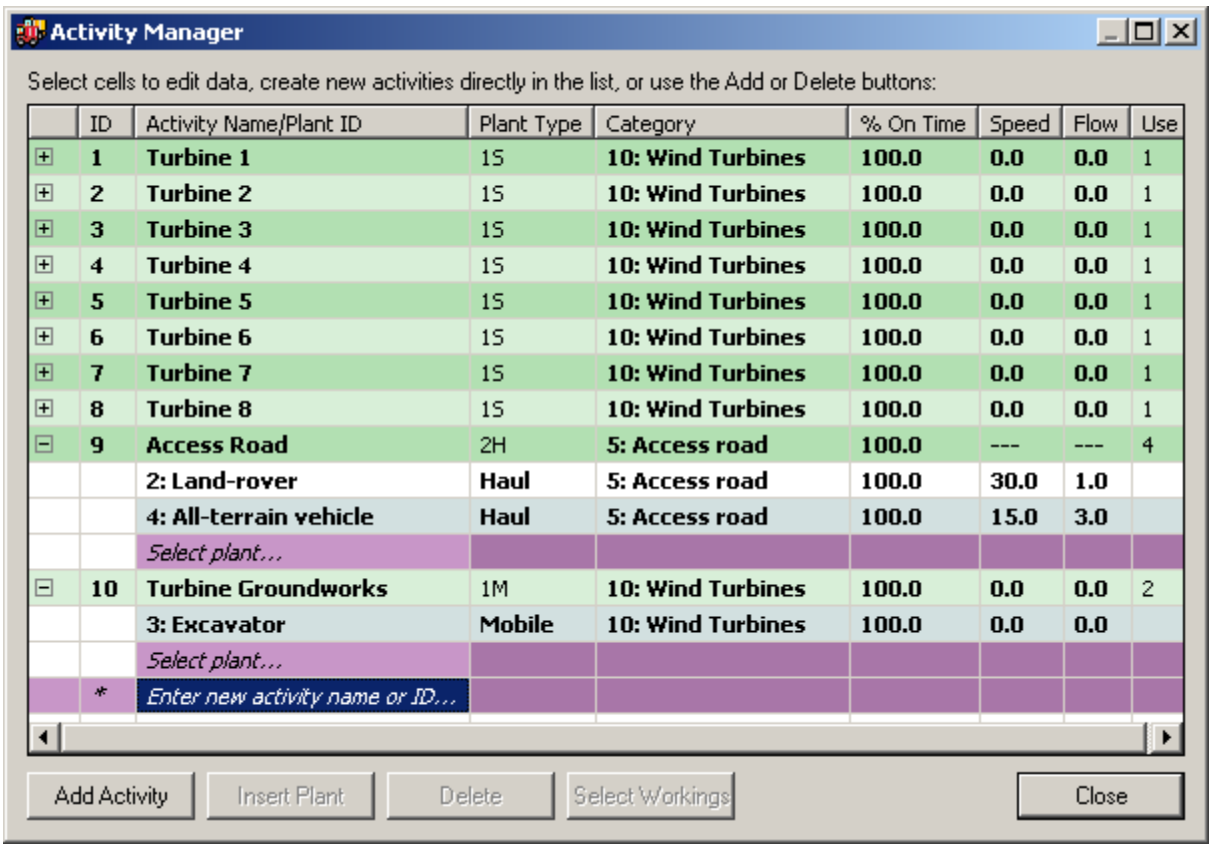
You can then navigate to the relevant scenario and use the **`Find`** function to locate the plant items and change them in that one scenario.

IMPORTING AND EXPORTING PLANT DATA

Plant data can be exported to a comma-separated (CSV) file which can then be imported into other noise models. You can also create a plant data file in CSV format for general use, saving you having to create a new file for each noise model. See *Export Plant*, p 12:7, or export a file to see the format.

ADDING ACTIVITIES

Each *SiteNoise* Model only contains one list of activities, but the properties of the activity (including the plant that it uses) can be different in each scenario. However, you may wish to set up the principal activities in the base scenario as this means that the activity is available for use in all child scenarios. An activity is only used when it is assigned to one or more working locations in a given scenario. Different activities can be assigned to different working locations in each scenario. Select **`Parameters, Activity manager`** from the menu and the **`Activity Manager`** dialogue will open. Click the **`Add Activity`** button or double click in the blue box reading ***`Enter new activity name or ID`*** … . You can now type a Name or Description for the activity in this box.



	ID	Activity Name/Plant ID	Plant Type	Category	% On Time	Speed	Flow	Use
⊞	1	Turbine 1	1S	10: Wind Turbines	100.0	0.0	0.0	1
⊞	2	Turbine 2	1S	10: Wind Turbines	100.0	0.0	0.0	1
⊞	3	Turbine 3	1S	10: Wind Turbines	100.0	0.0	0.0	1
⊞	4	Turbine 4	1S	10: Wind Turbines	100.0	0.0	0.0	1
⊞	5	Turbine 5	1S	10: Wind Turbines	100.0	0.0	0.0	1
⊞	6	Turbine 6	1S	10: Wind Turbines	100.0	0.0	0.0	1
⊞	7	Turbine 7	1S	10: Wind Turbines	100.0	0.0	0.0	1
⊞	8	Turbine 8	1S	10: Wind Turbines	100.0	0.0	0.0	1
⊟	9	Access Road	2H	5: Access road	100.0	---	---	4
		2: Land-rover	Haul	5: Access road	100.0	30.0	1.0	
		4: All-terrain vehicle	Haul	5: Access road	100.0	15.0	3.0	
		Select plant…						
⊟	10	Turbine Groundworks	1M	10: Wind Turbines	100.0	0.0	0.0	2
		3: Excavator	Mobile	10: Wind Turbines	100.0	0.0	0.0	
		Select plant…						
	*	*Enter new activity name or ID…*						

Activity manager

Now tab to the Plant ID/Name box and select a required item of plant from the drop down list *(Note: the list shows the items of plant you entered in the Plant Manager dialogue).*

Now tab to the Plant type and select Stationary, Mobile or Haul from the list, according to the type of plant and activity.

Next, select the Category. If you haven't set up any Categories, then you will only be offered 1:Default.

Next, select percentage on-time, Speed (km/h) and Flow rate (vehicles / hour). *Note: speed and flow are only used for haul activities.*

You can now add another item of plant to the activity, by clicking on 'Select new plant' and repeating this process.

Note that if you have chosen the plant type as Stationary, you can only add other stationary plant to this activity and you can only put the activity at a fixed working location.

If you have chosen Haul or Mobile, you can add other moving plant to the activity, but you will only be able to put the activity at a Route type of working location.

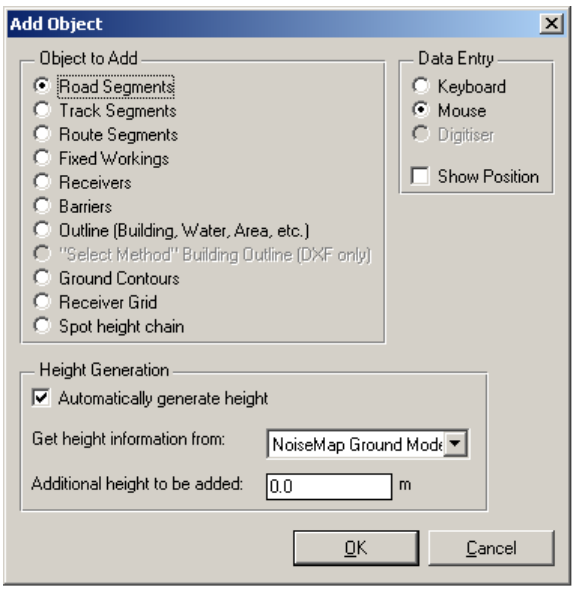
When you have added all the plant required for this activity, you can then double-click on **`Enter new activity name or ID`** to add another activity.

Assigning activities to working locations

When you have created some activities, you need to assign them to the locations where they will be operating. You do this from the **`Working Locations`** dialogue which is described in the following section. When an activity has been assigned to one or more working locations in the current scenario, then activity details are bolded in the Activity Manager and the number of locations where the activity is used will be shown under the column headed **`Use`**. Any activity can be assigned to any number of working locations. To see where these activities are located, click the **`Select Workings`** button at the bottom of the window.

ADDING WORKING LOCATIONS

You will now need to add working locations to the geographical model, if you have not already done so.



Add objects

You add these from the **Add Object** menu (or the green "+" toolbar button). For *SiteNoise*, you have two types of working locations:

- Route Segments – for moving plant, and
- Fixed Workings – for stationary plant.

Moving plant includes plant travelling as on a haul road, at a defined speed and number of movements per hour, and 'mobile plant on site' which moves more randomly over a limited area. You can have both types of moving plant on a route segment.

[Note: Do not use Road Segments for SiteNoise Haul Roads – these are used only for highway-type roads to be calculated by the CRTN method.]

Select the type of working location that you wish to add. You can also choose to get the height of the location automatically from the *NoiseMap* Ground Model by checking the **Automatically generate height** button. Then click **OK** to return to the graphical screen.

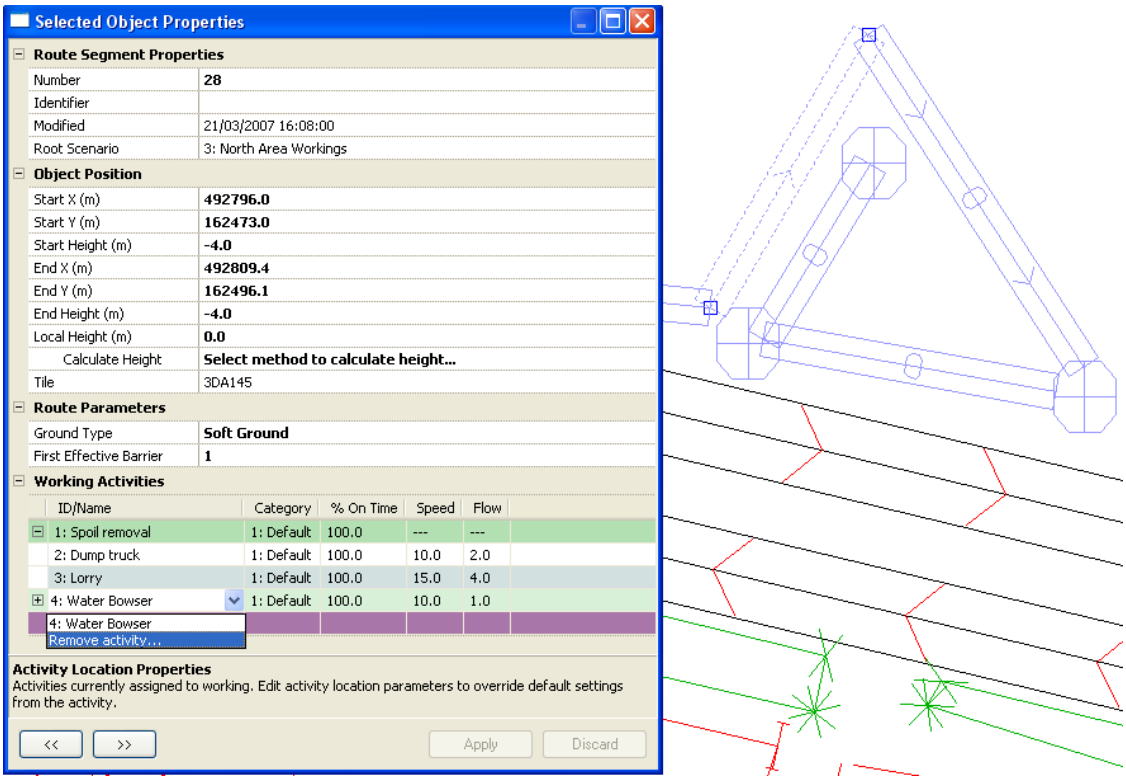
[Note: if the object you wish to add is greyed out in this dialogue, either your licence does not include SiteNoise, or the object type has been set to 'Grey' or 'Off' in the display options menu.]

You can now add the working locations to the model by clicking at the required position with the mouse. To terminate the string of locations, right-click the mouse. If you have been adding route segments, the string of segments will be selected and the **Multiple Route Segment Properties** dialogue will open. This enables you to modify the properties of these working locations and to add activities to them. You can add activities at this point, as explained next, or at a later stage if more convenient.

When you have finished editing the segments, click the Apply button or key F9 to finalise the changes.

PUTTING ACTIVITIES INTO WORKING LOCATIONS

The next step is to put activities into the working locations. Select the working locations where the activity is to be positioned and open the **Selected Object Properties** dialogue.



Working location properties

At the bottom of the dialogue is a section on Working Activities, with a purple line stating **`Select Activity to Add`**. Click on this and select from the drop-down list the activity you wish to assign to the currently-selected locations.

The above dialog shows a selected route segment working with the activities assigned to it, in the bottom section **Working Activities.**

The activity **Spoil removal** has two items of plant, a Dump truck and a lorry.

MULTIPLE WORKING LOCATIONS

You can assign an activity to many working locations at once. Select all the locations where you want the activity to take place. All the activities currently assigned to these locations will be listed in the Multiple Working property box. Those shown in italic are not currently assigned to all the selected locations, but you can do so by clicking on the activity name in the Working Property box and selecting *Assign to all selected workings*.

Removing activities

The activity Water Bowser has only one item of plant, the Water Bowser. Note that by highlighting this activity, the option to remove it is given.

Changing the properties of an activity

When you first add an activity to a location, its properties will be those you entered when you created the activity. However, you can change any property for each working location.

Click on the value you wish to change and then select **Override**. You can then change the value and the new value will override the original value for the chosen segments in this scenario.

You can expand any activity to see details of individual items of plant by clicking on the + sign at the left.

Navigation

When you create a line of route segments by clicking at a number of points in a continuous chain, *NoiseMap* remembers this chain, and you can navigate along it by clicking the forward and backward arrow buttons in the Object Properties dialogue, or by using the shift and arrow cursor keys. This will also work when you have selected a number of objects that are not physically chained, such as stationary workings.

If you want to apply the same change to a number of objects that are joined in a chain, you can select any object in the chain, and then select the rest of the chain with CRTL+R. Or you can select from the current object to the end of the chain with Ctrl+T, or to the start of the chain with Ctrl+Shift+T.

IMPORTING AND EXPORTING ACTIVITIES

You can import and export activities and their working locations using spreadsheets such as Excel or other sources. This uses the CSV (comma-separated values) format, and appears as follows in Excel. [To see the CSV layout, export an activity file and open it in a text editor such as NotePad.]

ACTNUM	ACTNAME	PLANTNUM	PLANTTYPE	CAT	ONTIME	SPEED	FLOW	WORKINGS
1	Theresa Hse Soft strip - fixed	1	APT_STATIONARY	20	100	0	0	6
2	Theresa Hse Soft strip - mobile	6	APT_MOBILE	22	4	0	0	2,3,7
2		3	APT_MOBILE	22	26	0	0	
2		7	APT_HAUL	22	20	15	4	

Activity import format

The header row is optional, and the data columns must be in the order shown. The data is as follows:

- ACTNUM - activity ID number of your choice; if you repeat the activity number in following rows, this adds extra plant items to the activity. If the activity number already appears in the loaded scenario, then the imported activity data will replace the existing activity data.
- ACTNAME – your name for the activity; if the name is different from that already loaded, the imported name will replace it. If you are using a number of rows to put several items of plant into one activity, you can leave this name blank in following rows.

- PLANTNUM – ID number of plant from current plant list; an error will occur if that ID number is not already in the plant list.
- PLANTTYPE – activity type – stationary, haul or mobile;
- CAT – category to be given to this activity; the category number must already be in the Category Parameter list.
- ONTIME - % of assessment period that this plant is making noise;
- SPEED – speed of plant (used on haul road only)
- FLOW – number of pass-bys of this plant per hour (haul road only)
- WORKINGS – an optional comma-separated list of all the Working IDs at which this activity is to be located (in the current scenario); the Working IDs must already be located in the currently-loaded tiles. If you have entered an activity number more than once (to assign multiple items of plant to the activity), only the first of these entries may assign the working locations. See below for program options if this column or list is omitted.

IMPORTING ACTIVITIES INTO AN EXISTING NOISE MODEL

There are three options:

- import activities and assign working locations;
- import activities but inherit working assignments from parent;
- import activities but do not inherit working assignments from parent;

Importing activities with working locations

NoiseMap normally assumes that when you import an activity file into a scenario, that file fully defines all the activities and their working locations for the scenario. If any activities are already assigned to working locations, these assignments are deleted. If you want to keep some existing assignments, you could first export the activity file and then make the required changes to the exported file before re-importing it. You cannot assign activities to working locations without also fully defining the activity. This means that any inheritance of activity properties from the parent scenario will be lost.

When you import an activity file, any activity ID numbers that do not already appear in the list of activities will be added, along with any assignment to working locations given in the imported file. If the activity ID number already appears, then all of its properties will be changed to those just imported. *Any previous*

plant or working assignments will be lost as are inherited properties.

Any existing activities that do not appear in the imported list will be unchanged, except that *any assignment to working locations in the current scenario will be deleted*. These activities retain their inherited properties.

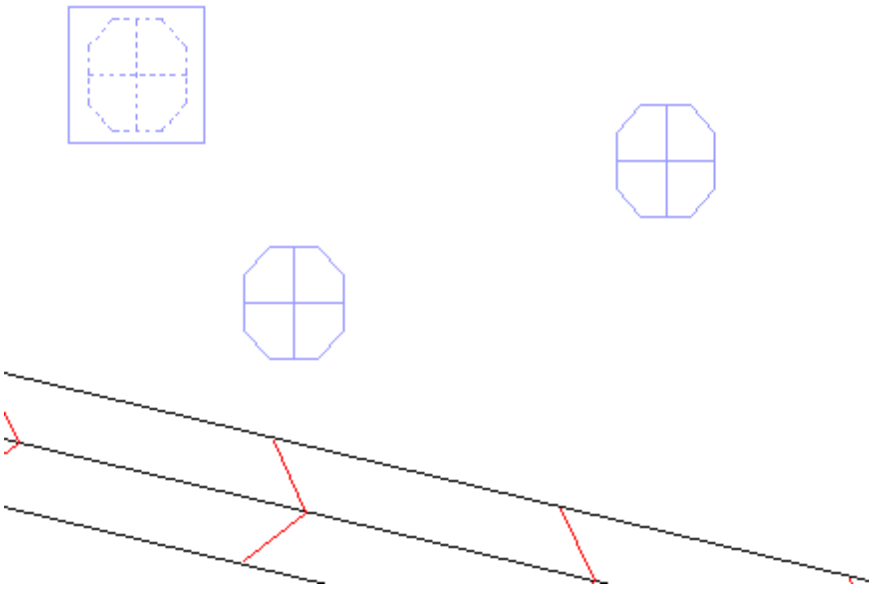
Import activities but inherit working assignments from parent

To inherit working assignments from the parent, omit the WORKINGS header **and** all working assignments from the import file. Only the activities are then changed.

Import activities but do not inherit working assignments from parent

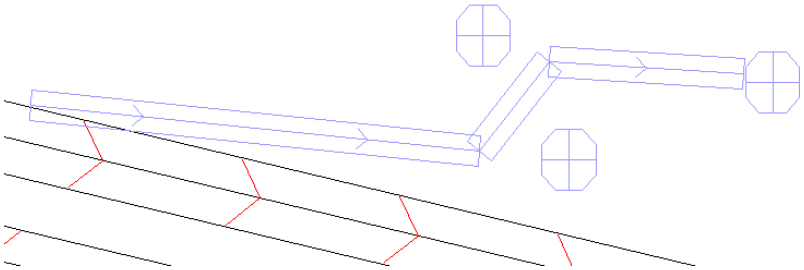
If the WORKINGS header is present, then all existing workings assignments are removed and only those in the imported file will be used.

PRESENTATION OF WORKINGS AND ACTIVITIES ON GRAPHICAL SCREEN



Presentation of fixed workings on-screen

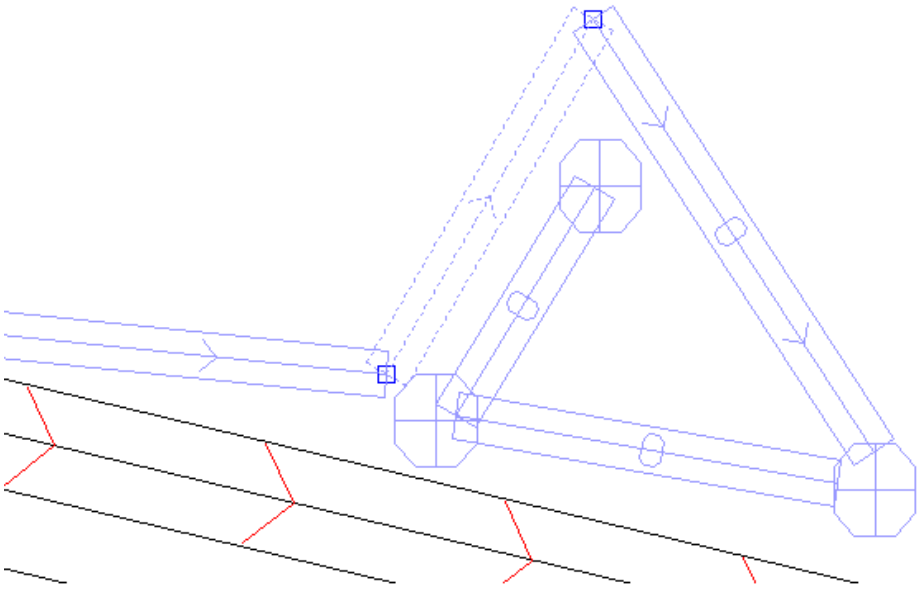
SiteNoise model showing F**ixed** workings (in blue), with one of them selected (highlighted). [NB part of a *Road* is also shown at bottom.]



Presentation of route workings on-screen

SiteNoise model showing **Fixed** and **Route** workings. The arrows on the Route workings, show that a Haul activity has been assigned. [NB part of a *Road* is also shown at bottom.]

In later versions of *SiteNoise*, fixed workings use a circular symbol. You can change the size of both fixed and route workings by selecting View > Display options from the menu and under the Types View tab going to Working Options.



Presentation of fixed and route workings with activities assigned

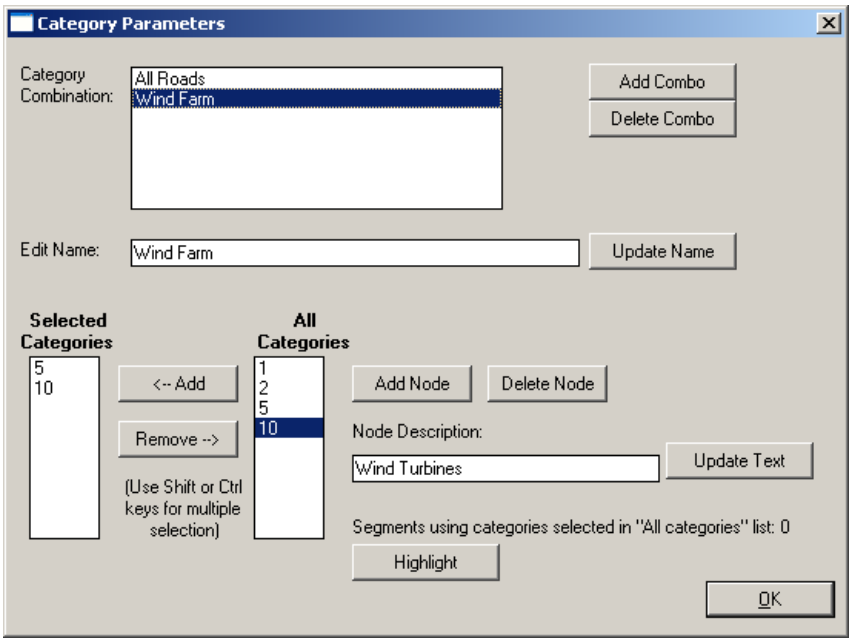
SiteNoise model showing **Fixed** and **Route** workings. Route workings with a **Haul** activity have arrows; route workings with a **Mobile** activity have ovals; route workings with both haul and mobile activities have both ovals and arrows. These symbols may not appear on very short segments. The dotted outline shows a selected route segment. [NB part of a *Road* is also shown at bottom.]

ASSIGNING CATEGORIES

You will often want to know how much noise is coming from individual items of plant or activities on the site. This is helpful when you need to find ways to reduce noise, or when you know that a certain activity will only be present for a short time and can then be excluded from the noise model.

You can do this by giving each item of plant, or each activity, a category number. If you don't want to do this, then by default, *NoiseMap* puts all plant and activities into Category number 1.

To use the Category system, select **`Parameters, Edit Categories`** from the menu and the **`Category Parameters`** dialogue opens:



Category parameters

In the above example, four categories (numbered 1, 2, 5 and 10) have been set up. These were added by clicking the **`Add Node`** button. [The term Node is a vestige of earlier *NoiseMap* terminology, and means the same as Category.] Each of these categories represents an activity or a group of activities and can be given a name in the 'Node description' box, which is stored by clicking **`Update Text`**.

Then, combinations of activities are set up by clicking the **`Add Combo`** button, typing in a name for the combination, and clicking **`Update Name`**. The categories to be included in that combination are added to the Selected Categories list by selecting them in the right-hand box labelled **`All Categories`** and clicking the **`<- Add button`**. In the above example, category 10 is Wind Turbines. Categories 5 and 10 have been included in a Category Combination called Wind Farm.

You are limited to a maximum of 100 categories and 30 category combinations. **Note:** categories and combinations are Global, ie

there is only one set of categories and combinations and this one set applies to all scenarios. You cannot have different categories or combinations in different scenarios, although activities could belong to different categories in different scenarios.

8. RAIL NOISE MODELLING

STARTING THE SOFTWARE

Before you start *RailNoise*, you will need to create a database that is enabled for *RailNoise*/ *RoadNoise*/ *SiteNoise*. The current database administrator tool (v.0.9.11 or above) will do this.

Old *RoadNoise*-only databases cannot store the information used by *RailNoise* and *SiteNoise*. If you connect to a database that does not support *RailNoise*, then the *RailNoise* options will be either greyed out or absent.

Start the software and connect to a suitable database in the normal way, as described in Section 3 of the *NoiseMap* User Reference Manual.

If this database already contains the geographical data (for example, it already has a road traffic noise model in it), then you can proceed to add train vehicles, train services and tracks as described in the following sections of this manual. If not, then create the geographical model, in one of the many ways as described in the *NoiseMap* User Reference Manual.

ADDING RAILWAY TRAIN VEHICLE DATA

Select **`Parameters, Train vehicle manager`** from the menu and the **`Train Vehicle Manager`** dialogue will open. Click the **`Add vehicle`** button or double click on the in the purple box reading ***`Enter new vehicle name or ID`*** … . You can now type a Name or Description for the train vehicle in this box.

Vehicle type

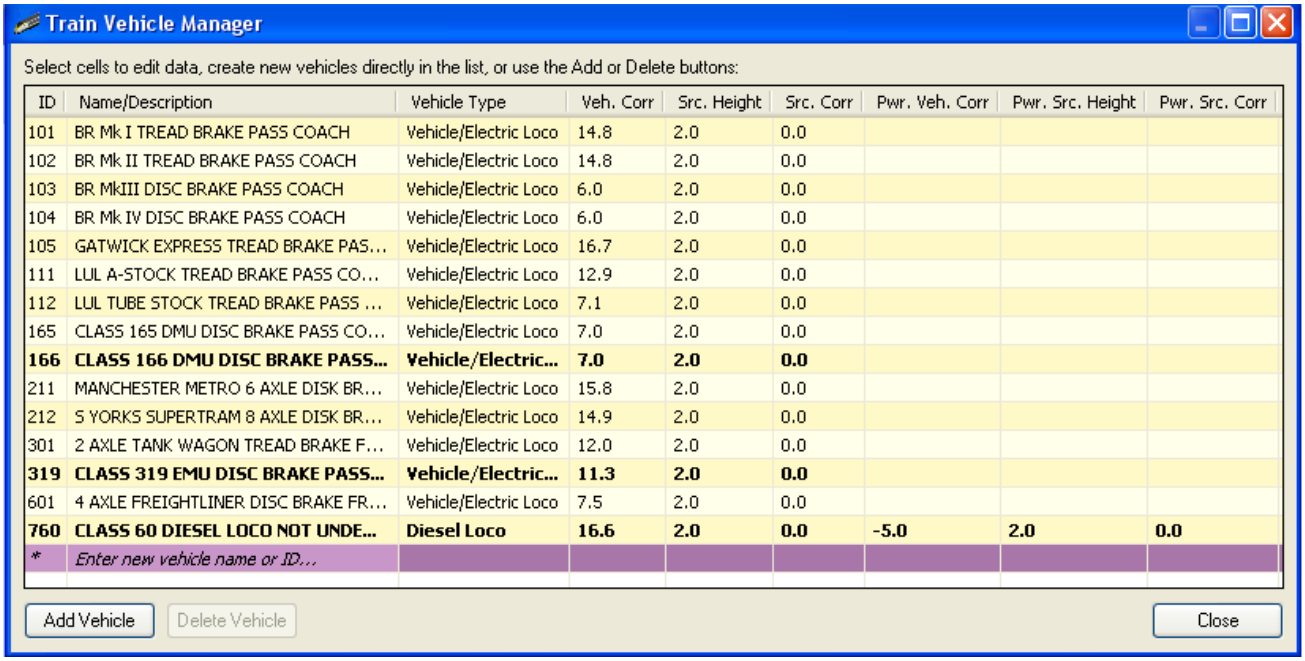
Then Tab to the Vehicle Type box. Select the drop-down list in this box and choose from

- Vehicle/electric loco; or
- Diesel loco; or
- Eurostar fan noise.

Then tab to the next box and enter the vehicle correction (Veh. Corr) as defined in Calculation of Railway Noise (CRN).

If the vehicle is a diesel loco, you need to enter both the rolling noise (Veh. Corr) and the on-power noise corrections (Pwr. Veh. Corr).

[The source height and source correction values are only required for CRTL (TNPM) calculations, see separate guide.]



ID	Name/Description	Vehicle Type	Veh. Corr	Src. Height	Src. Corr	Pwr. Veh. Corr	Pwr. Src. Height	Pwr. Src. Corr
101	BR Mk I TREAD BRAKE PASS COACH	Vehicle/Electric Loco	14.8	2.0	0.0			
102	BR Mk II TREAD BRAKE PASS COACH	Vehicle/Electric Loco	14.8	2.0	0.0			
103	BR MkIII DISC BRAKE PASS COACH	Vehicle/Electric Loco	6.0	2.0	0.0			
104	BR Mk IV DISC BRAKE PASS COACH	Vehicle/Electric Loco	6.0	2.0	0.0			
105	GATWICK EXPRESS TREAD BRAKE PAS...	Vehicle/Electric Loco	16.7	2.0	0.0			
111	LUL A-STOCK TREAD BRAKE PASS CO...	Vehicle/Electric Loco	12.9	2.0	0.0			
112	LUL TUBE STOCK TREAD BRAKE PASS ...	Vehicle/Electric Loco	7.1	2.0	0.0			
165	CLASS 165 DMU DISC BRAKE PASS CO...	Vehicle/Electric Loco	7.0	2.0	0.0			
166	**CLASS 166 DMU DISC BRAKE PASS...**	**Vehicle/Electric...**	**7.0**	**2.0**	**0.0**			
211	MANCHESTER METRO 6 AXLE DISK BR...	Vehicle/Electric Loco	15.8	2.0	0.0			
212	S YORKS SUPERTRAM 8 AXLE DISK BR...	Vehicle/Electric Loco	14.9	2.0	0.0			
301	2 AXLE TANK WAGON TREAD BRAKE F...	Vehicle/Electric Loco	12.0	2.0	0.0			
319	**CLASS 319 EMU DISC BRAKE PASS...**	**Vehicle/Electric...**	**11.3**	**2.0**	**0.0**			
601	4 AXLE FREIGHTLINER DISC BRAKE FR...	Vehicle/Electric Loco	7.5	2.0	0.0			
760	**CLASS 60 DIESEL LOCO NOT UNDE...**	**Diesel Loco**	**16.6**	**2.0**	**0.0**	**-5.0**	**2.0**	**0.0**
*	*Enter new vehicle name or ID...*							

Train vehicle manager

Train vehicle data and scenarios

Train vehicle data is the same in every scenario that you create. When you have entered the train vehicle data, the same data will be seen in all scenarios. You cannot change it for particular scenarios.

If you change any of the values for a train vehicle, this will affect every scenario in which it is used. Thus, if for example, you want to substitute a train vehicle for a quieter item so that you can repeat a calculation to see the difference it makes, you should add the quieter train vehicle to the list as a new item.

You can then navigate to the relevant scenario and use the **Find** function to locate the train vehicle items and change them in that one scenario.

IMPORTING TRAIN VEHICLES

You can import train vehicle data from a CSV file that has been prepared in a spreadsheet. Select **Import**, **Train vehicles** from the menu. Alternatively, use the Script interface. The spreadsheet must be in the correct format, see **Export Train Vehicles** for more information.

ADDING TRAIN SERVICES

Select **Parameters, Train Service manager** from the menu and the **Train Service Manager** dialogue will open. Click the **Add Service** button or double click on the in the purple box reading ***Enter new service name or ID*** … .

You can now type a Name or Description for the service in this box.

Now tab to the Select vehicle box and select a required train vehicle from the drop down list *(Note: the list shows the train vehicles that you entered in the Train Vehicle Manager dialogue).*

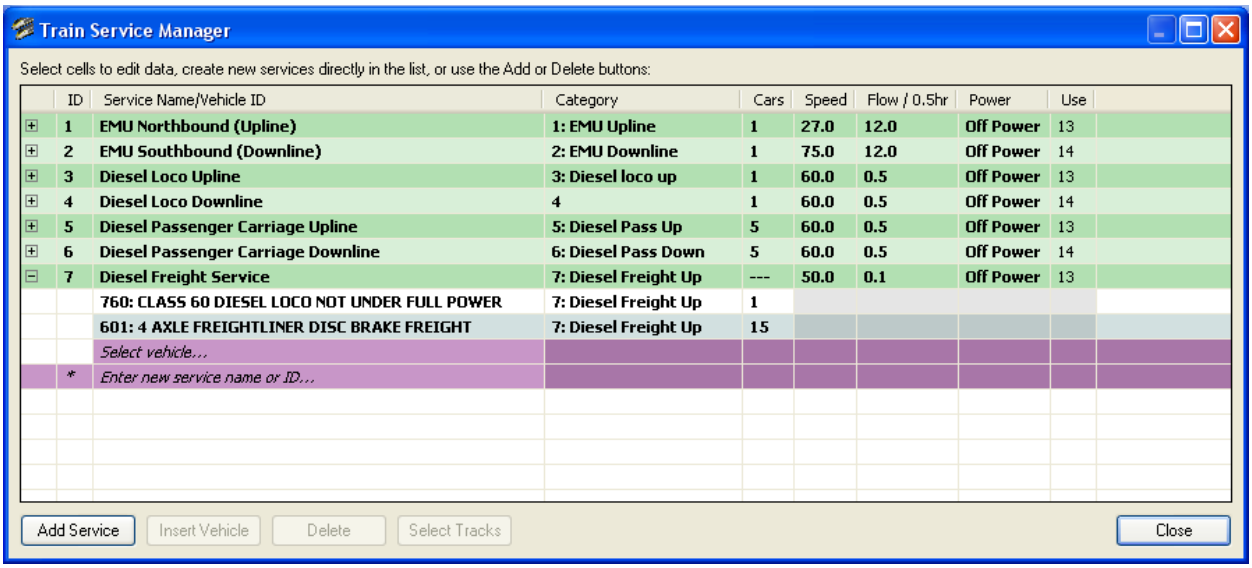
Now select the Category from the drop-down list. If you haven't set up any Categories, then you will only be offered 1:Default.

Next, enter the number of cars (Carriages), Speed (km/h) and Flow rate (vehicles / assessment period). The assessment period shown is that set in the **`Calculation Parameters`** window – CRN Rail Calculations, Measurement time.

Finally, select whether the vehicle is on-power or off-power as the initial (default) condition [the information is only used for diesel locomotives].

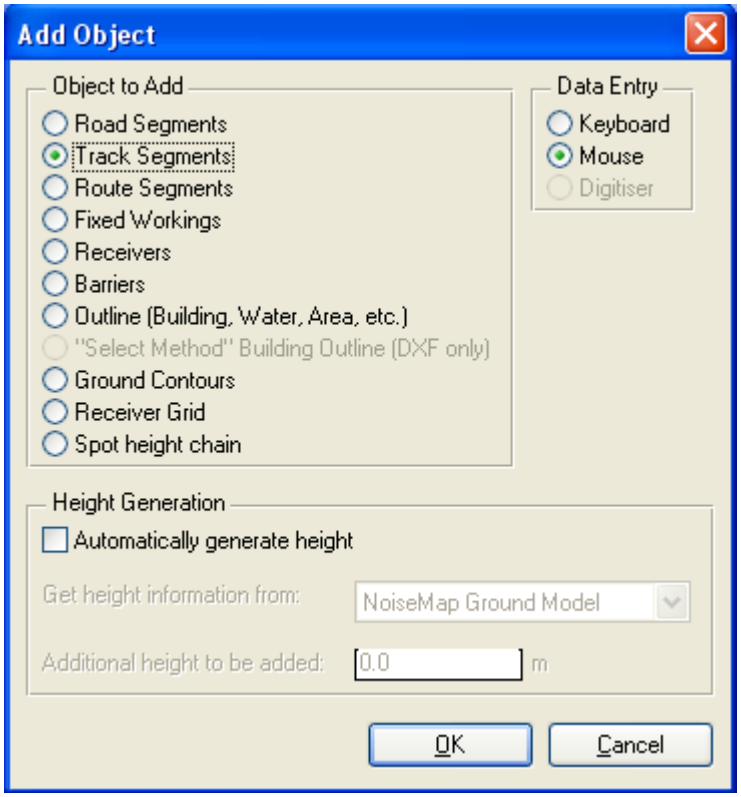
You can now add more train vehicles to the service, by clicking on 'Select vehicle' and repeating this process.

When you have added all the train vehicles required for this service, you can then double-click on **`Enter new service name or ID`** to add another service.



Train service manager

ADDING SEGMENTS OF TRACK



Add track segments

You will now need to add segments of track to the geographical model, if you have not already done so. You add these from the **`Add Object`** menu (or the green "+" toolbar button). For *RailNoise*, select:

- Track Segments

[Note: Do not use Road or Route Segments for RailNoise tracks – these are for highway-type roads or site-type segments to be calculated by the CRTN or BS5228 methods.]

[Note also: if Track Segments are greyed out, then either your licence does not include RailNoise or Rail Tracks are set to 'Grey' or 'Off' in the Display Options menu.]

You can choose to get the height of the tracks automatically from the *NoiseMap* Ground Model by checking the **`Automatically generate height`** button. Then click **`OK`** to return to the graphical screen.

If you do not choose to get the height of the tracks automatically when you are putting them in, you can still get their heights later, by selecting the relevant segment and then clicking on the **`Select method to calculate height box`** *and choosing the method. This automatically calculates the height.*

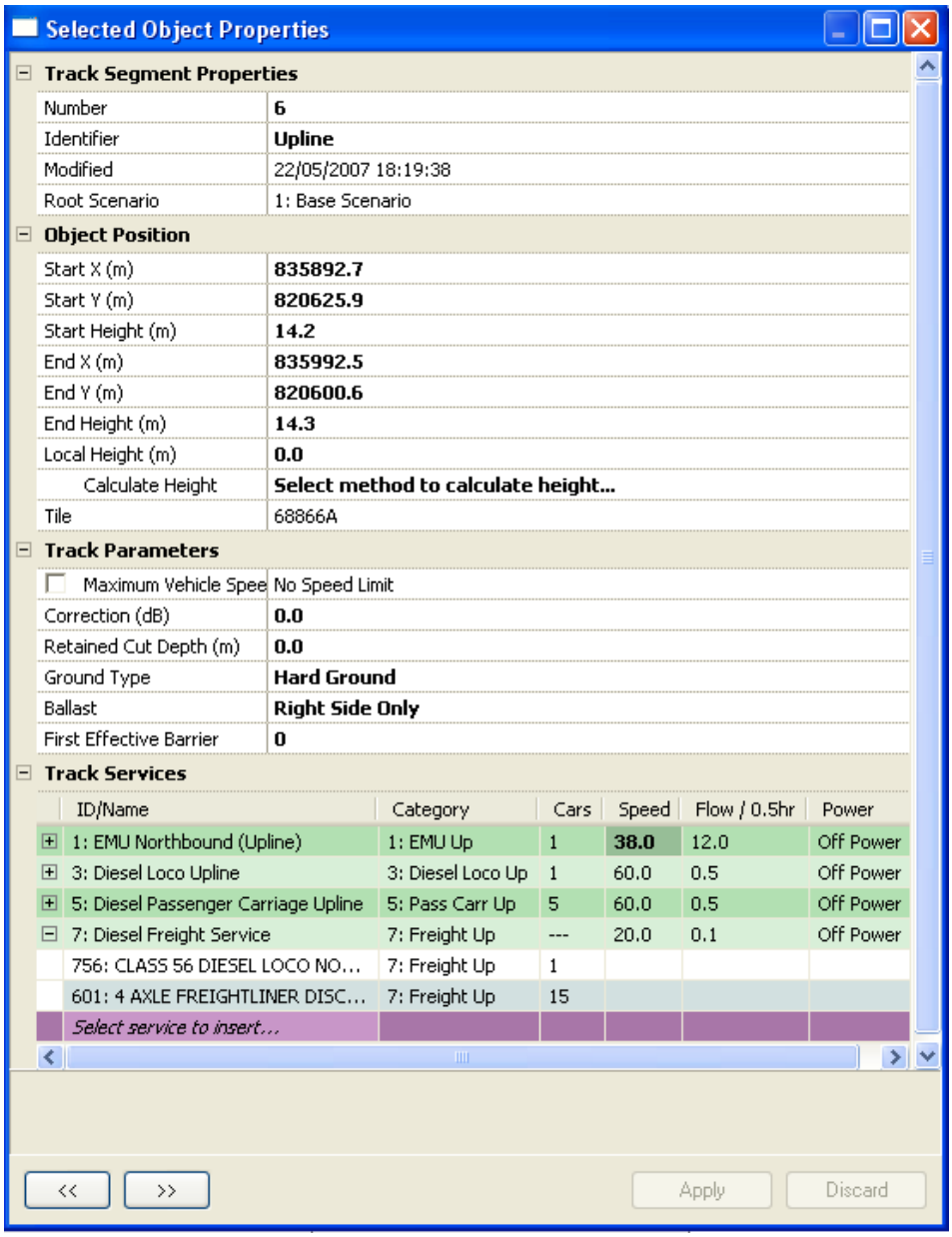
You can now add the segments of track to the model by clicking at the required position with the mouse. To terminate the string of locations, right-click the mouse. The string of segments will be selected and the **`Multiple Track Segment`**

Properties dialogue will open. This enables you to modify the properties of these segments of track and to add train services to them. You can do this at this point, as explained next, or at a later stage if more convenient.

Maximum speed

A new feature is that you can now enter the maximum speed for each segment of track. All train services will be limited to this maximum, when a higher speed was assigned to the service directly, either in the Train Service Manager, or on the Train Service properties for the segment of track. To apply a maximum speed, tick the checkbox and enter the required speed limit.

When you have finished editing the segments, click the Apply button or key F9 to finalise the changes.



Track segment properties

PUTTING TRAIN SERVICES INTO SEGMENTS OF TRACK

The next step is to put train services into the segments of track. Select the locations where the service is to be positioned and open the **`Selected Object Properties`** dialogue.

At the bottom of the dialogue is a section on Track Services, with a purple line stating **`Select Service to Insert`**. Click on this and from the drop-down list, select the service you wish to assign to the currently-selected locations.

The above dialog shows a selected route segment working with the train services assigned to it. You can show just summary details of each service, or by clicking on the + sign at the left, you can expand to show the full details.

Symbols used in Track Services window

In the summary line, if some of the train vehicle details are not identical (for example there may be one locomotive and many carriages), the number of cars (carriages) will show - - - to indicate this. Also, where a service property has been changed from the default value, this is shown in bold type.

It will also be noted that certain of the properties can only be set in the summary line, for example the speed and flow rate, since it is assumed that trains remain coupled in a unit. Also, the power setting can only be set in the summary line. This setting is only applied to any diesel locomotives in the service, but it is assumed that they would all have the same power setting.

Removing train services

To remove a train service from a track, highlight (select) the track on the screen then select the service in the Track Service section of the Object Properties dialogue. The option to remove the service can then be selected from the drop-down list.

Changing the properties of a train service

When you first add an service to a location, its properties will be those you entered when you created the service. However, you can change certain properties (such as the speed) on each segment of track.

Click on the value you wish to change and then select **Override**. You can then change the value and the new value will override the original value for the chosen segments in this scenario. Properties that have been changed from the default are shown in **bold** type.

You can expand any service to see details of individual train vehicles by clicking on the + sign at the left.

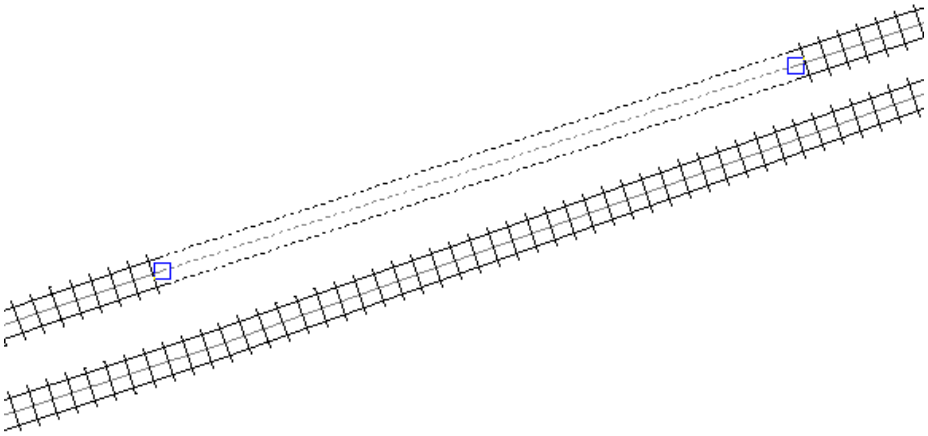
Navigation along chains

When you originally create a line of track segments by clicking at a number of points in a continuous chain, *NoiseMap* remembers

this chain, and you can navigate along it by clicking the forward and backward arrow buttons in the Object Properties dialogue, or by using the shift and arrow cursor keys.

If you want to apply the same change to a number of objects that are joined in a chain, you can select any object in the chain, and then select the rest of the chain with CRTL + R. Or you can select from the current object to the end of the chain with Ctrl + T, or to the start of the chain with Ctrl + Shift + T.

PRESENTATION OF RAILWAY TRACKS ON GRAPHICAL SCREEN



Presentation of railway tracks on graphical screen

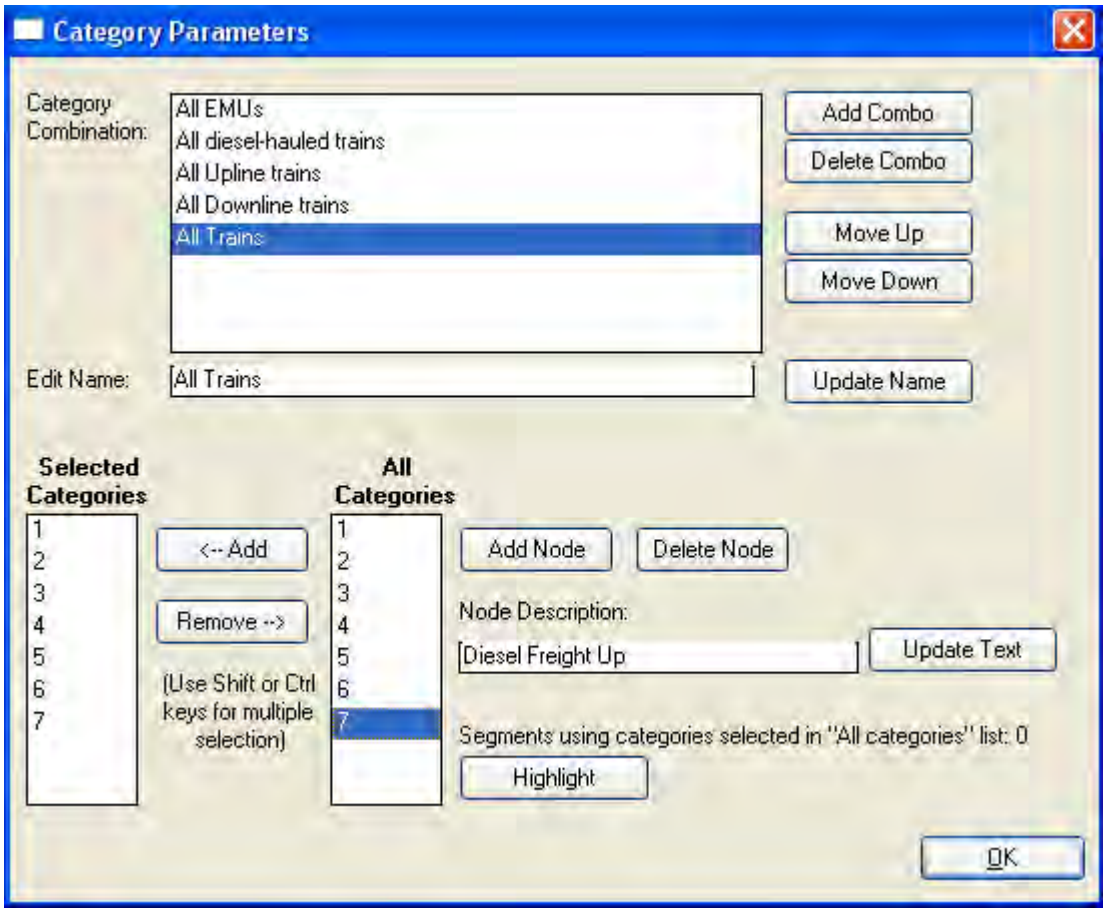
RailNoise model showing **Tracks**, with one of them selected (shown with a dotted outline).

ASSIGNING CATEGORIES

You will often want to know how much noise is coming from individual sections of track or train services on the railway. This is helpful when you need to know the contribution of a new service, for example, or when investigating ways of reducing noise.

You can do this by giving each train vehicle, or each service, a category number. If you don't want to do this, then by default, *NoiseMap* puts all train vehicles and train services into Category number 1.

To use the Category system, select **`Parameters, Edit Categories`** from the menu and the **`Category Parameters`** dialogue opens:



Category parameters in RailNoise

In the above example, seven categories have been set up. These are added by clicking the **`Add Node`** button. Each of these categories represents an individual train service.

Then, combinations of train services are set up by clicking the **`Add Combo`** button, typing in a name for the combination, and clicking **`Update Name`**. Then the categories to be included in that combination are selected in the left-hand box labelled Selected Categories. In the above example, categories 1 to 7 have been selected so as to include all the train services.

[**Note**: the Move Up and Move Down buttons are not available in the current version of *NoiseMap*.]

RAILNOISE CALCULATIONS

Once you have set up the *RailNoise* model, you can undertake noise calculations either at individual receiver points or of noise contours, using various methodologies which are described in the later chapters of this manual.

9. SCENARIOS

SCENARIOS EXPLAINED

Scenarios let you model many different situations in one database. For example you may wish to study a base case and one or more future scheme options. Each of these cases would be a separate scenario in *NoiseMap*.

A *NoiseMap* model can contain any number of scenarios, and each scenario can cover any number of map tiles. *[There are system limits but these are not a constraining factor in normal cases.]*

Quite often, you will be investigating a scenario that only differs from the base case in one or two geographical locations. For example, the base scenario might contain a road scheme with cuttings and embankments, but without any purpose-built noise barriers. Another scenario might be the same as this base, but with the addition of noise barriers in some locations.

In this situation, the 'with barrier' scenario is the same as the base scenario except in the small number of tiles where noise barriers have been added.

Parent and Child Scenarios

NoiseMap automatically keeps track of the differences between the 'parent' scenario (in this case the 'without-barrier' scenario) and the 'child' scenario (in this case the 'with-barrier' scenario). It only saves the objects (in this case the barriers) that are different between the parent and child scenarios. This greatly reduces the size of models when comparing different cases. This is important for efficient data handling when models cover large areas and have a great deal of mapping information in them.

Just as importantly, if changes are made to common objects (those used in many scenarios, such as the existing building layouts) in the parent scenario, then these changes will appear in all the child scenarios as well.

Adding new scenarios

You can add as many new scenarios to an existing database as you wish. All that you do to create a new scenario is to select 'Commit changes' from the file menu, and choose to save to a new scenario. In fact, it is not necessary for there to have been any changes when you create the new scenario.

Removing scenarios

Unwanted scenarios can be hidden from view, see Scenario Manager, below. For advice on Simplifying Scenarios, see also *Copying Scenarios*, below

Tiles that are not loaded

It is probable that when you are editing a model – perhaps to add noise barriers, as mentioned in our example above – you will only have loaded the tiles you are working on, maybe with one or two additional tiles to help you to see the area.

NoiseMap remembers which tiles contain the new or altered objects. It assumes that tiles that were not loaded are not affected in the new scenario, and so if you later choose to download one of these unaffected tiles, *NoiseMap* will supply the tile from the parent scenario, which is the scenario that was loaded when you first created the new scenario. If you then make changes to one of these previously unaffected tiles, it will be added to the list of files affected by the scenario.

SCENARIO MANAGER

The Database Previewer is the main user interface with the database. It shows the Scenario Tree and allows you to load your selected parts of the noise model. However, the Scenario Manager lets you:

- View the Scenario tree
- Hide unwanted scenarios
- Hide entire branches of the scenario tree
- Rename scenarios
- Read and modify the description of a scenario
- View contents of a scenario

When you have been working on a project for some time, you may have created many scenarios that you no longer require. Superseded scenarios cannot be removed because of the complexities surrounding the origin of objects. Hiding a scenario lets you use the previewer without having to scroll through superseded scenarios.

Renaming lets you choose a more suitable name or even just correct a typing error. The description of a scenario can be used to remind you of particulars, or even as to why you have hidden a scenario. The further details allow you to see how many tiles contain objects specific to the scenario, whilst the Noise Contour and Receiver Result Tiles indicate what calculations have been performed.

Copying scenarios

If you wish to simplify a scenario tree, you export the scenario of interest as a *NoiseMap* archive and then import this archive into

a new database. However, you can only export a single scenario – inheritance information from parent and to child scenarios is not retained.

You can use the same method if you wish to make a copy of part of a database. Use the database previewer to select the scenario of interest and then load the tiles that cover the area of interest. Then export the loaded tiles as an archive (**`File`**, **`Export Archive`**). You can then load the archive into a new database.

RULES OF INHERITANCE

The usual way to create a new scenario is to load an existing scenario, make some changes to it, and then save (commit) these changes to a new 'child' scenario, thus leaving the original (parent) scenario unchanged. *[However, you can create a new scenario by loading a scenario and then saving it as a new scenario without making any changes at that stage.]*

Whenever you create a new scenario, only the objects that you changed or added will be different from those in the parent scenario, and it is only those differences that are saved in the database. The rest of the objects are 'inherited' from the parent scenario.

Later, you may choose to make changes to objects in the parent scenario. If you change an object in a parent scenario, then usually the changes you make will also appear in any child scenarios.

However, when you edit an object in the child scenario, then this breaks the chain of inheritance from its parent. Once the chain of inheritance is broken, any subsequent changes you make in the parent object are no longer carried down to the child.

This is the normal action you would expect: a child scenario might represent a different phase of development of a scheme, with the segments of road, track, etc., in different places. So if you move the position of a road in a child scenario, you would not want its position to be altered again if you later adjust its position in the parent scenario.

As a further example, if you add more receiver points in a parent scenario, you would normally want these additional receiver points to appear in the child scenario as well. (If you don't, then you would have to delete them from the child scenario.)

These rules of inheritance are built into *NoiseMap* and cannot be altered by the user.

However, some objects such as train vehicles, train services, plant and activities can be used over many scenarios covering a wide area, and therefore for these objects it is necessary to give the user more control over the rules of inheritance.

The following section explains this in more detail.

GEOGRAPHICAL OBJECTS

Most of the information in a scenario is specific geographical information that is located in specific tiles of the model. For this type of information, changes between scenarios are made by loading the tiles, editing them, and saving the changes to a new scenario.

Geographical information is local to a tile and scenario – if you make any change to a geographical object (such as a road, a segment of track, ground contours, barriers or receiver points), it will affect that scenario and all the children of that scenario.

However, if you change the properties of a geographical object in a child scenario, this breaks the chain of inheritance. This means that *any* subsequent changes to that object in the parent will no longer appear in the child or its descendants. This remains true even if you change the properties of the child back to be the same as the parent – once the chain of inheritance is broken, it cannot be restored.

Root scenario

To help you to see how far back the inheritance goes, you can use the View as colour Inheritance option. This shows the root scenario for each object in the current scenario (ie the scenario where the *current* properties of the object were entered.)

INFORMATION NOT SPECIFIC TO PARTICULAR TILES OR SCENARIOS

As described in the preceding section, most information in a noise model is specific either to a particular tile (such as the location of a road segment) or a particular scenario (such as a traffic flow) and is therefore 'local' to that tile or scenario. Its current value could have been inherited from a parent, but it would be possible to change it to a different value for any particular tile or scenario.

However, some information cannot sensibly be limited to a particular tile or scenario, because confusion would arise if different settings applied to different tiles or scenarios. For example, there could be confusion if different tiles in a given scenario were calculated with different cut-off distances or Barrier Level Adjustment settings, because it might be difficult to find out which values were used for each tile, without checking them all.

To avoid such problems, certain information is made the same in all scenarios in the database and is known as 'global' information.

Global information specifically includes:

- Calculation control parameters
- Barrier Level Adjustment Settings

- Categories and combinations
- Site plant definitions
- Site Activity definitions
- Train vehicle definitions
- Train service definitions

The following section explains how *NoiseMap* handles these global objects.

CALCULATION PARAMETERS

If you make changes to the calculation parameters, you can save these to the database, and they will not 'invalidate' any contours already calculated, because the calculation settings are stored with the contour information. However, *NoiseMap* will only store one version of a contour per scenario (to avoid accumulating superseded contours) so if you need to save the results of different calculation settings, you should set up different scenarios for the purpose.

Nevertheless, you should be very careful when making changes to the calculation settings when a project is underway, and particularly if several people are working on it, as this could cause different tiles to be inadvertently calculated with different settings. If you are making changes to the calculation settings for test purposes, you would be advised to use the 'Set for Session' option.

BARRIER HEIGHT ADJUSTMENTS

NoiseMap allows noise barriers to be assigned to a different set of barrier height adjustments in each scenario. However, the **amount** of each barrier height adjustment is 'global' – in other words a single set of adjustments applies to all tiles in all scenarios. You cannot have different amounts of adjustment for each scenario.

RAILNOISE OBJECTS

Train vehicle definitions

Train vehicle definitions are global to all tiles and all scenarios – any change to a train vehicle definition in any tile or scenario will affect **all** other places that the train vehicle is used. If you want to make changes to a train vehicle for just one scenario, you will need to enter it as a new train vehicle.

Service definitions

When you create train services (by using the Service Manager) you select the train vehicles to be used in the service and enter initial values for the train vehicle category, speed, flow rate and power setting. These initial values are called **default** values in *RailNoise*.

These default values will be used whenever you apply a service to a segment of track unless you **override** them. If you change the default values in Service Manager, the new values will appear in all workings where you are using the default values.

Overriding default values

However, you can 'override' the default value in any specific segment of track. To override a default value in any particular location, you will need to load the tile and scenario concerned and then enter the override values. Once you have overridden the default value, changes to the default value will not affect the override value. Overridden values are shown in bold.

You can override the default values both for individual train vehicles and for the whole service. An override for the whole service takes precedence over an override for an individual train vehicle. Unlike geographical objects, you can revert to the default value by cancelling the override.

By keeping service settings at their default values, you can make 'global' changes to service settings in the Service Manager. These changes will affect all tiles and all scenarios that use the default settings, without having to load them first.

You can apply a service only once to any segment of track, in any one scenario. If you need to apply similar train services more than once on a segment of track, you must create new train services for the purpose.

SITENOISE OBJECTS

Plant definitions

Plant definitions are global to all tiles and all scenarios – any change to a plant definition in any tile or scenario will affect **all** other places that the plant is used. If you want to make changes to an item of plant for just one scenario, you will need to enter it as a new item of plant.

Activity definitions

When you create activities (by using the Activity Manager) you select the items of plant to be used in the activity and enter initial values for the plant category, on-time, speed and flow rate. These initial values are called **default** values in *SiteNoise*.

These default values will be used whenever you apply an activity to a working location unless you **override** them. If you change the default values in Activity Manager, the new values will appear in all workings where you are using the default values.

Overriding default values

However, you can 'override' the default value in any specific working location. To override a default value in any particular location, you will need to load the tile and scenario concerned and then enter the override values. Once you have overridden the default value, changes to the default value will not affect the

overriding value. As a visual indicator, overriding values are shown in bold.

Note that you can override the default values both for individual plant and for the whole activity. An override for the whole activity takes precedence over an override for an individual item of plant.

By keeping activity settings at their default values, you can make 'global' changes to activity settings in the Activity Manager. These changes will affect all tiles and all scenarios that use the default settings, without having to load them first.

Note that unlike geographical objects, you can revert to the default value by cancelling the override.

You can apply an activity only once to any working location, in any one scenario. If you need to apply similar activities more than once in a working location, you will need to create new activities.

ROADNOISE OBJECTS

Roads

Road segments are local to a scenario. Any change to any property of a road segment breaks the inheritance chain for that road segment.

Traffic flows

Traffic flows are local to a scenario, but are common to all tiles. This means that each scenario can have a different set of traffic flow data, and that data will apply to all tiles in the scenario.

10. NOISE CONTOURING

NOISE CONTOURING

INTRODUCTION TO *NOISEMAP* FEATURES

NoiseMap has a different approach to noise contouring compared with earlier versions of the software because you do not use the mouse to delineate an area to be contoured. Instead, *NoiseMap* calculates contours on a range of noise indexes for a whole tile and stores the results in the database, where they are saved for future use. You can then download the contours and display them in many ways, and export them in a number of formats.

In addition to calculating noise contours on your local machine, with the remote server version of *NoiseMap*, you can add details of the tiles to be contoured to a calculation queue held on the server. Other machines can then be set to listen to the calculation queue and to share in the calculation process. This can greatly speed up the contouring of large areas.

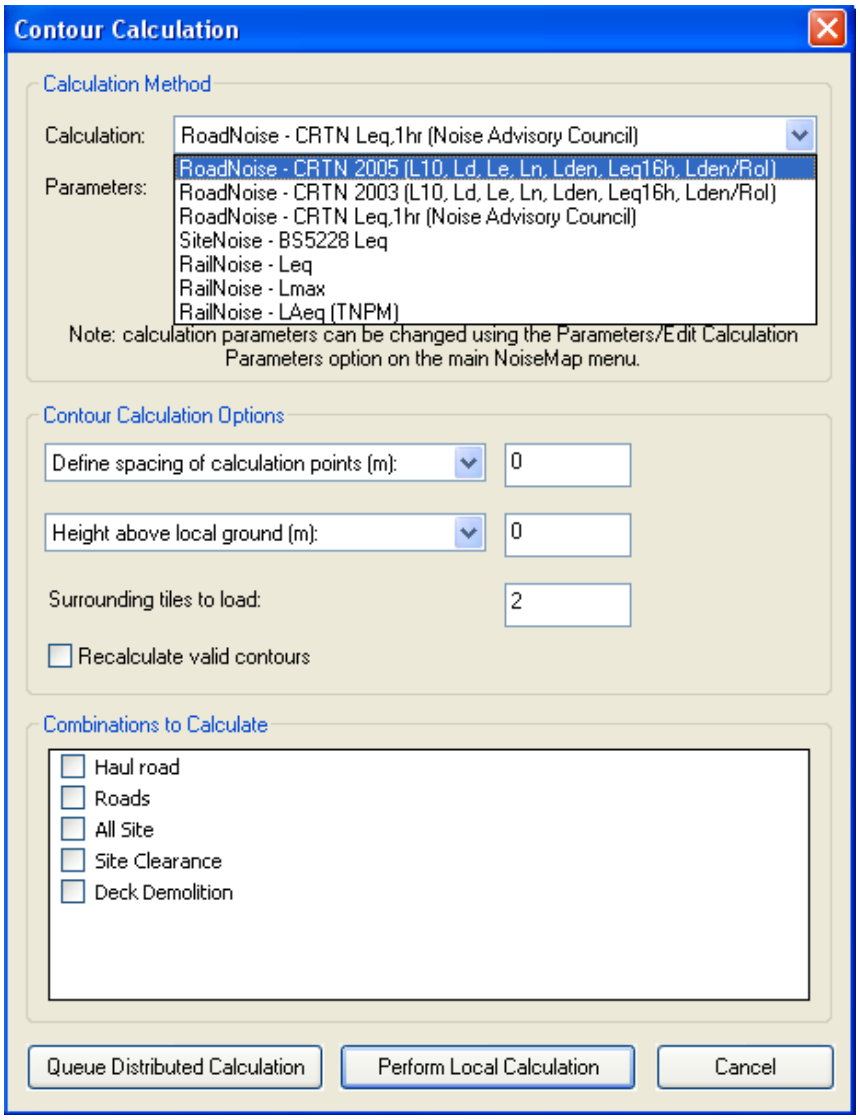
This chapter describes the available options and how they are used.

CALCULATE DATABASE NOISE CONTOURS

This option calculates noise contours and stores them directly into the database. Database noise contours are calculated for a full tile. If you wish to calculate a noise contour for a specific area (which may cover part of a tile or parts of several tiles, use the **Calculate Contour** option (if available in your version of the software).

Before you start, you must **Load** the scenario for which you wish to calculate the contour, *(see Loading Tiles from Database, on page 4:8)*.

Next, select **`Calculate`**, **`Calculate database contours`** and then select the tiles you require by clicking with the mouse. You can select many tiles by clicking and dragging the selection rectangle over the area of interest. Alternatively, you can use the list box to select all loaded tiles or any previously named area.



Contour calculation options

Calculation method

Now select the calculation method selecting the appropriate item from the drop-down list at the top of the dialogue box. The calculation parameters that will be used for the calculation are shown in the information area below the method selection box.

The Road calculation options only calculate for highway-type road sources. Rail and Site sources have their own calculation procedures. Choice of calculation method is discussed later in this chapter.

Noise contour grid spacing and calculation height

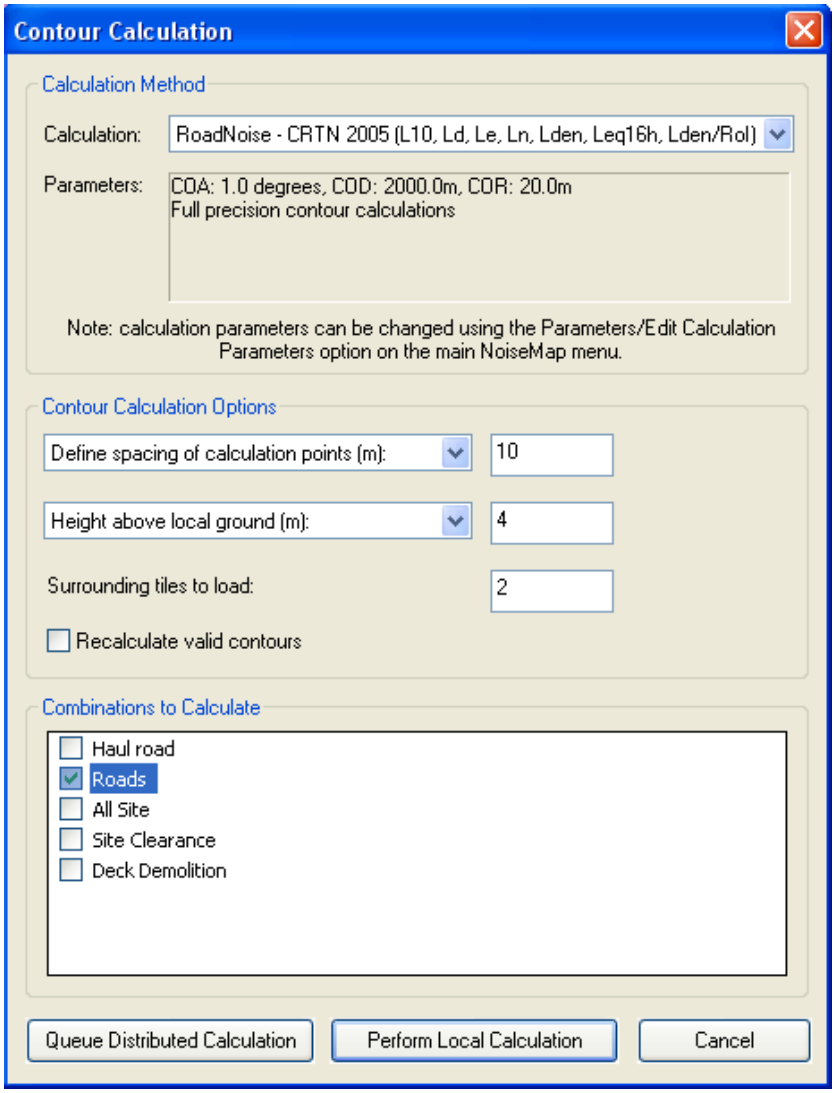
You must now choose the spacing of the calculation points (typically 10 m) and the height of the contour above local ground level (4 m for Environmental Noise Directive contours).

Surrounding Tiles

At this point, you can choose the surround margin of tiles that will be included in the noise contour calculation, to avoid 'edge effects'. In areas close to major roads (say within 1 km) a surround margin of two tiles is usually adequate. In areas which

are distant from any major roads, a much wider surround will be needed. Motorways can affect L_{den} at distances of 3 km. If you are choosing a wide surround, you should also increase the cut-off distance, otherwise, roads will be excluded even where they have been downloaded.

When your calculation starts, the appropriate tiles are first downloaded from the database and then the calculation begins. An indicator will show progress. If you have selected several tiles to be noise contoured, then these will each be done separately. For each tile, the appropriate surrounding tiles will be downloaded and the noise contour will be calculated. When that tile is completed, the result will be stored and the next tile (and its surround) will then be downloaded.



Contour calculation resolution

Calculation precision

The calculation precision is now set as one of the general calculation parameters. CRTN requires 'each stage' in a calculation to be rounded to 0.1 dB in the direction that gives the higher noise level. This requirement is intended to reduce differences between calculation procedures that work to different levels of precision and to err in favour of the provision of noise

insulation. However, this procedure can also cause discontinuities in the calculations which show up as jagged contours. Selecting **`Calculate to full precision`** will give smoother contours, but the results may differ slightly from strict CRTN calculations as a result of these rounding effects.

Multiple category combinations

You can calculate simultaneously the noise contours for any number of previously-defined category combinations. Check the boxes alongside the ones you wish to be calculated in the list box before starting the calculations. Note that increasing the number of combinations does not significantly increase calculation time.

Re-calculate valid contours

Although invalid contours will always be recalculated, this tick-box allows you to recalculate valid contours as well. Invalid contours are those where the model has been altered in the tile to be displayed, or in any of the surrounding tiles that were used when the contour was calculated.

Queue distributed calculation

Clicking this button submits the contour calculation to the Calculation Queue (Remote Server Version only). This allows any machine that is listening to the calculation queue to participate in noise contour calculation. Note that your machine will not participate, however, as it is not listening to the calculation queue (it cannot do this whilst you are using the local computer to do other noise modelling tasks).

Perform local calculation

If you want the calculation to be done on your local machine (for example because no other machines are listening to the calculation queue, or are perhaps tied up in a long calculation) then click the Local Calculation button.

Do you wish to load calculated contours now?

When the calculations have been completed, you can load the newly-calculated contours from the database, thus letting you check the results.

The options for displaying noise contours are described in the section on Contour Display Parameters, see page 10:9.

CHOICE OF CALCULATION METHOD

RoadNoise

The Road calculation options only calculate for highway-type road sources. Rail and Site sources have their own calculation procedures. For *RoadNoise*, the calculation will depend on the periods covered by the traffic data – which can be 18-hour,

day/evening night or 24 by 1-hour periods. Using this data, the calculation options are:

***RoadNoise* CRTN All 2005**: This calculates L_{10} using the standard CRTN calculation method and then applies adjustments to obtain L_{den}, L_d, L_e, L_n, L_{eq} 16-hour and L_{den}(ROI) (Method A or B). The L_{den} calculation and its components are calculated according to the method advised by Defra/TRL in 2005.

***RoadNoise* CRTN 2003:** This calculates the same parameters as *RoadNoise* 2005, but using the slightly different method for converting L_{10} to L_{den} originally advised by Defra/TRL in 2003. It is retained for backward compatibility but should not normally be used.

***RoadNoise* Leq** – the Noise Advisory Council L_{Aeq} method. This method does not give the same results for Leq as the 2005 method and is no longer widely used.

It is recommended to choose the *RoadNoise* CRTN 2005 method in normal cases, as this also includes the CRTN L10 method.

The 2003 conversion method gives three methods, using hourly, d/e/n or 18-hour traffic flows respectively. The method requires the L_{A10} noise level for each segment to be calculated and then converted to Ld/e/n using the appropriate formula, then all the segment contributions are combined.

The 2005 method uses only method 3 (18-hour L_{A10} to Ld/e/n), and requires the L_{A10} values for all non-motorway segments to be combined and then converted to Ld/e/n, and all motorway segments to be combined and converted to Ld/e/n and then summed to give the noise level at the receptor.

In other words, the 2003 method converts the noise contribution from each segment to Ld/e/n, whilst the 2005 method gets the total noise level in L_{A10} and then converts it. Because the conversion formula is linear in terms of noise levels whilst the combination formula is logarithmic, this can result in slightly different final noise levels.

Finally, it should be noted that the advice for the 2005 method is to use method 3, ie 18-hour flows. In practice, little work has been done using one-hour or period flows and users are advised not to use one-hour or period flows without seeking advice from NoiseMap Ltd.

NRA/RoI Method – The National Roads Authority of the Republic of Ireland publishes Guidelines for the treatment of Noise and Vibration in National Road Schemes. The current version (published 25th October 2004) is based on the use of CRTN with conversion formulae to give L_{den}, which is the noise index used by NRA.

The Guidelines give two methods, A and B, for calculation of Lden, with method A (the preferred method) requiring the

calculation of 24 1-hour L10 values from 24 1-hour traffic flows, and method B requiring the calculation of the L10 (18-hour) from the 18-hour traffic flow. The Guidelines give formulae for converting these values to Lden. Atkins has produced a research paper which shows that when the NRA's standard diurnal traffic flow profile is used, Methods A and B produce very slightly different results, but the Method B results can be converted to Method A results by the application of a simple formula, to give an identical result within calculation tolerances. This means that it is unnecessary to enter the 24 1-hour traffic flows in order to use Method A, as long as the standard traffic profile is applicable (which is true in almost every situation).

RailNoise calculation methods

There are three options for *RailNoise* calculations

- CRN Leq – calculation of the Leq index in accordance with 'Calculation of Railway Noise 1995' and subsequent addenda;
- CRN Lmax – calculation of the Lmax index in accordance with the TNPM system used for the Channel Tunnel Rail Link
- CRN LAeq (TNPM) calculation of the Leq index in accordance with the TNPM system used for the Channel Tunnel Rail Link.

The TNPM methods are specialist procedures and full details are given in a separate manual available from NoiseMap Ltd.

The Leq index uses the measurement time to be set via the **`Parameter, Edit Calculation Parameter`** dialogue. The same dialogue is used to set up the cut-off distances, angle of view and calculation precision.

SiteNoise calculation methods

SiteNoise calculations are made in accordance with BS5228:1997. Various enhancements to the standard method can be selected via the **`Parameter, Edit Calculation Parameter`** dialogue. These are described in a separate manual available from NoiseMap Ltd. The same dialogue is used to set up the cut-off distances, angle of view and calculation precision.

COMPARE DATABASE CONTOURS

NoiseMap has powerful facilities for comparing any two contours saved in the database. This lets you find the differences between two scenarios, or between two contours (say day and night) and you can also add together two situations. However, you cannot save the results of a comparison as a new situation.

Select **`Calculate`**, **`Compare database contours`** from the menu. You will be presented with a dialogue box asking you to select the tiles you wish to compare. You can select the tiles

with the mouse or from a previously-named area. You are then presented with a list of all the scenarios common to all the tiles you have selected. Highlight the scenarios you wish to compare. You will be shown the category combinations that apply to all the selected scenarios. Highlight the category combinations you wish to compare. If you have calculated contours at different resolutions (grid spacings), you will also have the option to selected the resolution you require. Note that you can only compare contours that have been calculated at the same resolution. When you click **OK**, you will be presented with the list of scenarios and category combinations that you selected.

Your options are to:

- Add the noise contours logarithmically (decibel addition)
- Subtract contour 2 from contour 1 and show the difference

Select the required scenario and category combination, and the right-hand window will show the available noise contours. Select the ones that you wish to compare and click **OK**.

You may also choose to select only valid contours and to interpolate null results within buildings. The effect of these options is described below.

You may also select a noise floor. This is to prevent spurious differences in noise levels being shown in areas beyond the useful area of the model that are dominated by ambient noise. A typical noise floor might be 30 dB, for example.

The values will be retrieved from the database and the comparison will be displayed on the screen.

LOAD DATABASE NOISE CONTOURS

The database stores noise contours in complete tiles. Before you can download any database contours, **you must first load at least one tile** in the scenario of interest, though this does not have to be in the area you are contouring.

Select tiles to load

To download the noise contours, next you must select the tiles that cover the required area. To select the tiles, select **Calculate**, **Load database contours**. This will bring up the **Select Tiles to Load** dialogue. There are several ways of selecting the tiles to be loaded. You can choose to download contours covering:

- a named area (if you have any);
- the area where you have already downloaded noise model;
- the whole area of the noise model (ie the populated area)

Whichever method you choose, the display will re-centre on the selected tiles, which will turn purple.

Selecting tiles with mouse

You can change the selected tiles by using the mouse, as follows:

- Clicking a tile *toggles* its selection (it selects a tile that was not selected, and deselects a tile that was selected). You can click and drag to toggle the selection of a number of tiles.
- Shift-click *deselects* a tile. You can click and drag to deselect a number of tiles.
- Ctrl-click *selects* a tile. You can click and drag to select a number of tiles.

Combination to show

You should next select the required category combination from the list and click **OK**.

Select contour to load

A further window will open asking you to Select the Contour to load. In the list, highlight the contour and click **OK**.

If the database does not contain any noise contours for the selected tiles, you will be informed.

The database will now be queried and the selected tiles will change colour as follows:

- Green – database contains a valid contour of the type requested
- Red – database contains an invalid contour of the type requested
- Purple – database contains no contour of the type requested.

Only load valid contours

This tick-box allows you to load either all relevant contours, or only those that are still valid. (See below).

VALID AND INVALID CONTOURS

A valid noise contour is one where there has been no change to the model since the contour was calculated, either within the tile of interest or in any of the surrounding tiles within the calculation margin.

An invalid noise contour is one where the model has been changed since it was calculated. The change could have been made in the selected tile or in one of the surrounding tiles within the calculation margin. The user must use his judgement as to whether the contour can be accepted, as the database does not record the exact nature or location of the change. Note that non-geographic changes (such as a percentage on-time) do not invalidate any results.

When the required noise contour has been downloaded, the Contour Properties dialogue will open. You can now select the display method for the contour, as described next. When you

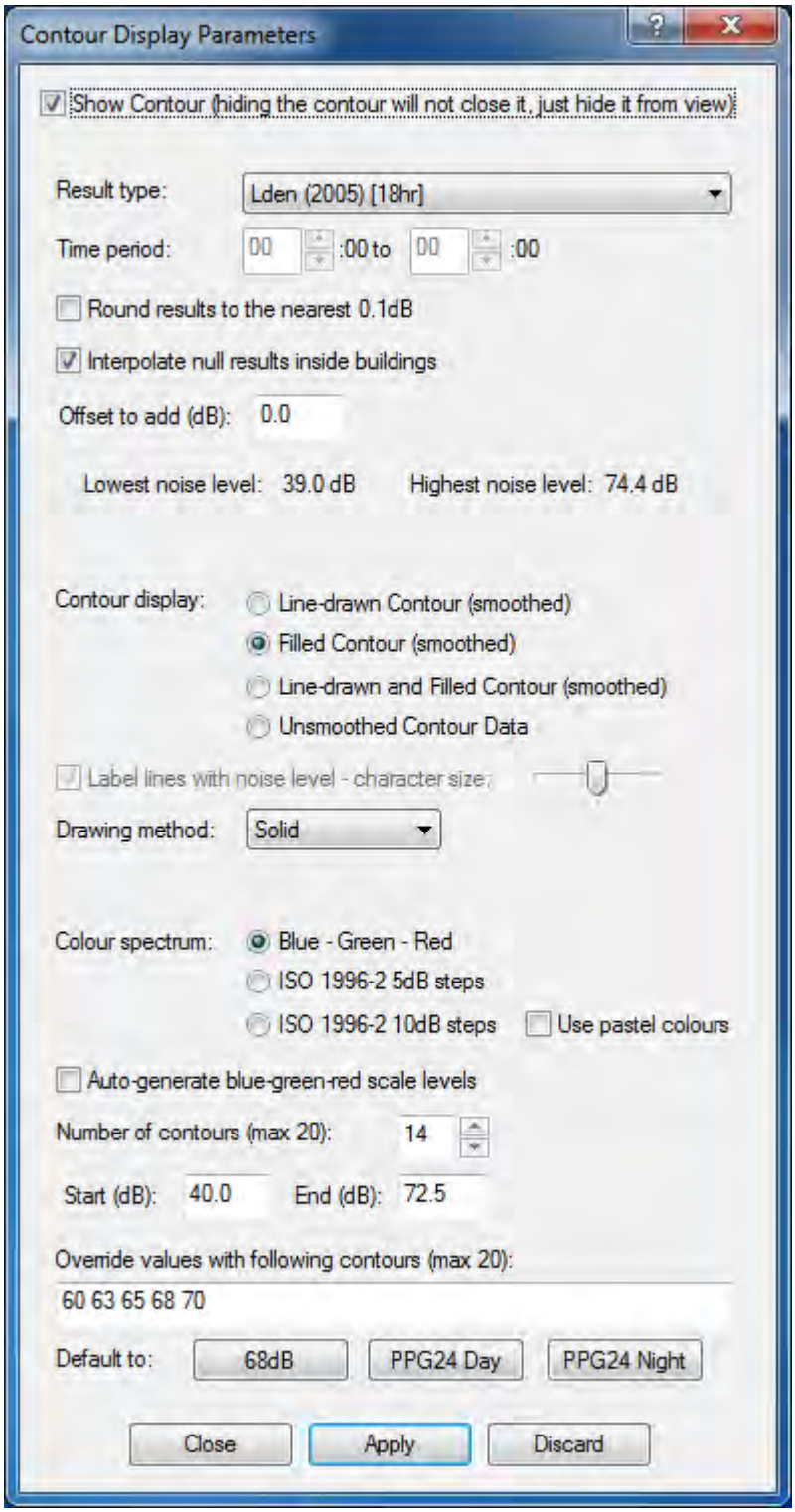
have done so, the contour will be drawn. This may take some time, since although the noise levels have been calculated, the position of the contour boundaries, the colours and method of display still need to be computed.

CONTOUR DISPLAY PARAMETERS

When a noise contour is loaded, you are presented with the contour display parameters dialogue box where you can control the appearance of the noise contour map. It may be used repeatedly to change the appearance of the map, without having to reload or recalculate the noise levels.

SHOW CONTOUR

This check box allows you to display or hide the contour, which may be useful when checking some detail on the map. It does not close the contour, and so it can be quickly displayed again.



Contour display parameters

Result type

Where a contour calculation produced a variety of noise indices, a drop-down list lets you choose which index to display; note that the time period in brackets e.g. [18h] is not the time covered by the chosen index, but the traffic flow period on which the calculation is based.

Time period

If the noise index is defined for a particular time period, such as Lday, then the time period will be shown in these boxes and cannot be changed by the user. Note that the period starts at the time shown in the left-hand box and ends at the time shown in the right-hand box (strictly, it finishes at the end of the preceding hour).

If you choose an hourly result, you can select any start and end hour by typing or using the up and down buttons. Note that if the end hour is earlier than the start hour, then the time period will go through midnight (00:00). To include a 24-hour period, the start and end times are the same, eg 00:00 to 00:00 or 06:00 to 06:00 will both give a 24-hour average. A one-hour average is given, for example, by: 06:00 to 0:700 or 23:00 to 00:00.

Noise levels are arithmetically averaged for L_{A10} and energy-averaged for L_{Aeq} indexes, in accordance with usual convention.

Round results to the nearest 0.1 dB

This rounds the results before the contours are generated, and affects the contour range labels. This is explained in detail in the following section.

Interpolate null results inside buildings

Noise levels are not calculated for any grid points that fall inside a building outline. A null value is stored in the database to show this. By default, *NoiseMap* interpolates values for these null points in order to produce a smooth contour. This prevents the null values from distorting the contours when they are plotted, which is especially important when a noise map is plotted without the buildings superimposed. If you uncheck this box, then no interpolation of null values will take place. This is useful if you intend to export the raw data to another application.

If you choose not to interpolate results, then *you can only display the unsmoothed mesh*. Other options are greyed out. Squares that contain points with null values are coloured white.

Offset to add

You may wish or add or subtract a particular amount to every single contour point. For example, you may know that the whole of a noise map is affected by one source, and this can be reduced in level by 0.8 dB. Putting an offset value of -0.8 in this box will reduce all values by that amount.

Lowest and highest noise level

NoiseMap reports the extreme values it encountered whilst calculating the contour map. This includes the value of any offset that you have added.

CONTOUR DISPLAY

You choose one of four options:

- **Line-drawn Contour (smoothed)** – The lines can be labelled with the contour values.
- **Filled contour (smoothed)** – This produces colour-filled areas representing the various noise levels with a scale on-screen to aid identification.
- **Line-drawn and Filled contour (smoothed)** – This is a combination of the two above options.
- **Unsmoothed contour data** – This displays the actual value of each calculation point, in a square mesh with the same spacing as the original calculation grid. The squares are centred around the calculation points and are coloured according to the noise level of the respective calculation points. If you chose not to interpolate null results in buildings, this is the only display option.

CONTOUR LABELS

Line-drawn contours can be labelled by noise level as follows:

- **Label contour lines with noise level** – Check this box to label line-drawn contours with the noise level as an aid to identification. Note that this breaks the contour line at the position of the label. Uncheck this box if you need to export continuous contour lines (for example when post-processing).
- **Character size** – Move the slider to adjust the size of the noise level labels when selected on the line-drawn contours or when lines are drawn between the contour fills.

DRAWING METHOD

Filled contours can be painted over a background bit-map in solid or transparent colour. Some transparent colours need a bit-map in order to be visible.

Solid – masks any bit-map detail (default)

White bgnd – visible over a black-on-white bit-map

Black bgnd – visible over a white-on-black bit-map

Mixed bgnd – all bit-maps visible, but contours have reversed colour on a white background.

CONTOUR SCALE

This section sets the contour scale for line-drawn and filled contours, and also lets you choose the colours of filled contours

Colour spectrum

NoiseMap offers several options for displaying colour-filled contours:

- **Blue-Green-Red** – choice of auto-ranged or user-selected contour intervals,

- **ISO 1996-2 standard spectrum – 5-decibel steps** – standard contour steps and colours, 5 dB apart
- **ISO 1996-2 standard spectrum – 10-decibel steps** – standard contour steps and colours, 10 dB apart

The ISO spectrum always represents the same band of noise levels with the same colour, which can be an advantage. With the Blue-Green-Red Spectrum, you can let *NoiseMap* choose the scale to fit the range of noise levels, or select your own range. This can permit smaller intervals over a range of interest, or can be used to emphasise particular noise criteria.

In either case, a key is displayed on-screen to show what noise level is represented by each colour.

Use Pastel colours

Pastel colours are paler versions of the normal colours. They may allow base-mapping detail to be seen more clearly through the contour shading and can save ink.

CONTOUR INTERVALS

Auto-generate blue-green-red scale levels

If you check this option, *NoiseMap* will select a suitable spread of contours at a regular 2.5dB interval using the red-green-blue colour spectrum, or fixed 5 or 10 dB intervals if you choose the ISO colour spectrum.

If you select the red-green-blue colour spectrum and de-select auto-generation of the scale levels, you can choose your own start and end values, and number of contours. This controls the contour interval. The maximum number of contours possible is 20 (producing 21 colours).

- Number of Contours – n
- Start Value - s
- End Value – e

The contour interval will be (e – s)/(n-1)

Note that e must be greater than s and that n is a whole number.

CHOOSING PARTICULAR CONTOUR VALUES

There are a number of ways of plotting specific contour values:

- **Override Values with following contours** – this lets you plot a number of irregularly spaced contours (up to a maximum of 20) then enter the values in the box provided, with spaces separating each value:

  ```
  60.0  60.5  61.5  65.0  70.0
  ```

  NoiseMap will use your values as contours.

- **68dB Button** – Produces a contour at 65.5dB. This is because the standard that requires the 68dB value specifies a facade level, whereas the contour map is free-field. The standard 2.5dB adjustment is used to produce a contour in the correct place for the standard.
- **PPG24 Day Button –** Produces a contour map based on the UK Government's PPG24 standard day-time values.
- **PPG24 Night Button –** Produces a contour map based on the UK Government's PPG24 standard night-time values.

[Note: Both the PPG 24 buttons assume that you have made an L_{A10} calculation and adjust the thresholds accordingly. If you have converted to L_{Aeq} values, you will need to enter the thresholds manually.]

Apply

Allows you to apply the current contour settings without closing the parameter display dialogue box. This lets you test the effect of different display options.

CONTOUR INTERVAL BOUNDARIES

The contour interval scale will normally show a series of ranges such as:

42.5 – 45.0

40.0 – 42.5

37.5 – 40.0

The boundary values are repeated to show that there is no gap in the scale. The calculation results may be stored either with a 0.1 dB precision (using the procedure described in CRTN) or with the full precision of the computer calculation, which is usually equivalent to about 6 significant decimal digits. The precise method of classifying a calculation result can be explained by an example. Consider the range 40.0 to 42.5. Any value less than 40.0000 (ie exactly 40) is allocated to the lower range of 37.5 to 40.0. Thus a value of 39.9999 will be allocated to 37.5 to 40.0. A value of 42.4999 will be allocated to the range 40.0 to 42.5.

Where results are to be allocated in accordance with 'conventional' rounding, this can be obtained by selecting 'Round results to nearest 0.1 dB' in the contour display parameters window. This has the effect of rounding results before they are displayed, or before they are exported as ASCII or ESRI grid values. If this option is chosen, then a value of 39.9999 will be rounded up to 40.0. The category boundaries will also be adjusted to correspond. Thus the rounded value will be allocated to the 40.0 to 42.4 category. A value of 42.4999 will be rounded to up 42.5 and will be allocated to the 42.5 – 44.9 category.

Whilst this may give a cleaner treatment of boundary values, it should be noted that noise models are not accurate to fractions of a decibel. Moreover, it removes some of the precision in the calculation, giving additional 'jitter' on the contour map.

CHANGING THE WAY THAT NOISE CONTOURS ARE DISPLAYED

If you want to change the way that the noise contours are displayed, for example to change from ISO to Blue-Green-Red contour colours, open the Contour Display Parameters dialogue box. Select **`Calculate`**, **`Contour Display Parameters`** or click on the rainbow-coloured contour display toolbar button (only visible when a contour is loaded).

CLOSE CONTOUR

This closes the contour and clears it from the computer memory although it will remain in the database. If you only want to temporarily hide the contour, then uncheck the **Show Contour** checkbox in the Contour Display Parameters window.

DISPLAY CONTOUR AREA BREAKDOWN

This outputs the area in square metres of the currently-displayed noise contour to the 'All Output' page. The information is broken down to give the area within each of the noise contour ranges as used in the current noise contour display. The area analysis is based on the calculated noise levels: either raw results or interpolated within building outlines, depending on what was selected when the contour data was downloaded. If rounding to 0.1 dB is chosen, then this will be taken into account. Each calculation point is taken to represent an area equal to the square of the grid spacing, thus with a 10 m grid spacing, each point represents 100 square metres. The areas are calculated exactly to the tile edges, so points on the edges represent half the area (5 square metres in this example) and points in the corners represent one-quarter of the area (2.5 square metres in this example). The area within buildings will be excluded from the analysis if uninterpolated (raw) results have been selected, so the area of contour will be less than that of a full tile.

JAGGED CONTOURS

When you have downloaded contours, you may notice discontinuities at tile edges, where there is a sudden change of noise level following horizontal or vertical lines, or sometimes diagonal 'staircases'. This is usually caused by an important road being omitted from the calculation of the quieter tile because the tile that contains it has not been downloaded. To correct the problem, the tile will have to be recalculated with a greater surround margin.

With the contour still loaded, click **`Calculate`**, **`Calculate Database Contours`**. You will see a dialogue box stating that

you already have contours loaded and asking if you want to close them and continue. The lower part of the dialogue box asks if you want to check edge differences. This means that *NoiseMap* will check the noise calculations at touching tile edges. Ideally, they should always be the same, but might not be for the reasons mentioned above. You can ask *NoiseMap* to select tiles to be recalculated based on:

- minimum difference between adjacent tiles that you are concerned about want *NoiseMap* to flag up;
- the maximum tile surround that you wish *NoiseMap* to use when calculating any tile.

NoiseMap will check all the adjacent tile edges and highlight in purple any that should be recalculated according to your criteria.

You will then be presented with a dialogue box that allows you to select the tiles to be calculated. You can add extra tiles to those proposed by *NoiseMap*.

CONTOUR CALCULATION PROCESS

When you instruct *NoiseMap* to start a noise calculation (either for a contour or a specific receiver) the first operation is to download from the database the noise model for the selected tiles and the appropriate surrounding tiles. This can take some time, depending on the area and number of objects in the model. A window indicates the stage that the download has reached.

Simplifying Outlines

The next step in the calculation procedure is to 'simplify' the building outlines so as to convert the buildings into noise barriers. The simplified outline is obtained by tracing round the building to produce a series of barriers that do not deviate from the façade line by more than 1.5 metres. At the same time, any internal separating walls between buildings are eliminated. The height of the barriers thus formed is obtained from the *NoiseMap* ground model. This procedure can reduce the number of barriers in the model by an order of magnitude, without creating any significant errors. There can be tens of thousands of these, and a progress bar indicates how far the process has gone. If you want to see these barriers, then make the screen re-draw, for example by clicking in it.

When the barriers have been added, the calculations commence, again indicated by a progress bar. As soon as the calculation is complete, *NoiseMap* contacts the database again and saves the results. If it is connected to the calculation queue, it will then download the next tile in the list and repeat the process.

When the calculation queue becomes empty, *NoiseMap* will wait, checking the calculation queue once every two minutes until another tile is put into the queue, or the user quits from the queue.

COMBINED SOURCE MODELLING

NoiseMap will import models containing road, rail and site noise sources. The topographical and geographical features of the model are shared between all the noise sources. However, the different types of noise source must be entered and modelled separately, as in earlier versions of *NoiseMap*. This means that road segments and railway line workings must be entered, the appropriate traffic flows and rail services must be created and the noise calculations must be run.

STOPPING *NOISEMAP*

If at all possible, you should always shut down *NoiseMap* through one of the proper procedures to ensure that everything is properly saved. You must **never** shut down whilst *NoiseMap* is saving to the database, as this could corrupt the database and cause a deadlock which will lock everyone out of it. If you think this might have happened, contact your administrator immediately, before any further damage occurs. The same caution applies should *NoiseMap* for any reason crash whilst saving to the database.

CLEAR NOISEMAP

This option closes the currently-loaded model, but leaves you connected to the current database. You will be reminded to save any changes that you have made. Use this option when you want to load a new area of the model, for example.

EXIT

Makes a clean exit from *NoiseMap*, saving any configuration changes that you have made and reminding you to save any model changes.

QUIT

This option appears on the Distributed Calculation progress bar. It stops the current calculation and disconnects you from the calculation queue and also from the database. You will need to log in again to continue working.

ABORT

This appears on the Contour Calculation progress bar. If you click Abort, the current calculation will be terminated and progress on the current contour will be discarded.

ABORT AT END

This appears on the Contour Calculation progress bar. If you click Abort at end, the current calculation will continue until it has completed and the resulting contour will be saved in the database. No further contour calculations will be started.

11. CALCULATION AT INDIVIDUAL RECEIVERS

INTRODUCTION

Whilst noise mapping usually involves calculation of noise levels at a grid of points, *NoiseMap* can equally deal with individual receivers, ie specific points where noise levels are to be calculated.

Advantages of using individual receivers

Compared with contouring, there are some advantages in using individual receivers

- Can be located at specific points of interest
- Far fewer calculation points, so much faster
- Can be free-field or façade receivers
- Can input specific angles of view
- Can cover a range of heights
- Detailed calculation can be printed out
- Can readily show the contribution from different parts of network
- Can be used for 3-d viewing of noise levels

Methods of adding receivers

Receivers can be added in a variety of ways, including:

- Manual entry of individual receiver points
- Creation of a grid of receiver points
- Automatic generation of receiver points around buildings,

Local vs database receiver calculations

Receivers can be calculated purely locally with the calculation presented on the local computer without being added to the database. This lets you obtain a detailed printout of the calculation process, see page 16:4. This can be helpful when verifying a noise model.

However, on verified models, this detail is unnecessary and it is better to store the receiver results in the database to help with subsequent analysis and display. These 'database' calculations

can either be done locally or when using a 'remote' database, they can be added to the calculation queue for distributed calculation (ie by multiple computers).

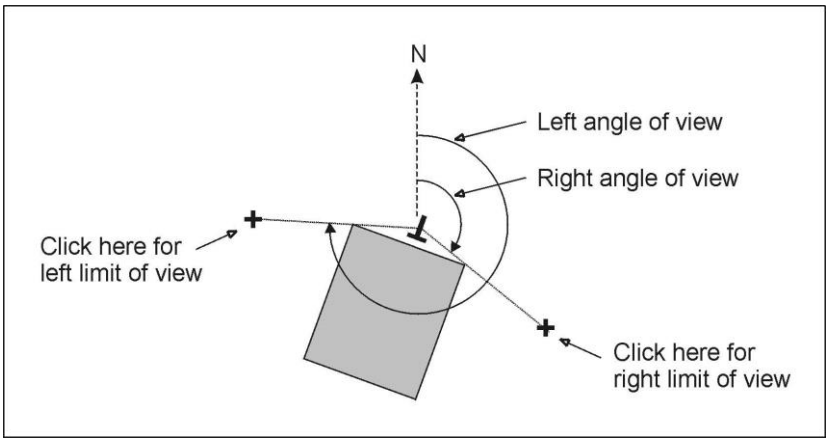
ENTERING INDIVIDUAL RECEIVER POINTS MANUALLY

Individual receiver points can be added manually from the 'Add objects' menu. Click on the **Add** button and select **Receivers**. Then click at the point where you want the receiver to be positioned. *[If the Receivers option is greyed out, Receivers have been set 'Grey or 'Off' in the Display Options menu.]*

If the point is a *façade receiver* (ie 1 m in front of a façade), you should then put in the limits of view. Move the mouse to the left-hand limit of the view and click, then move it to the right-hand limit of the view and click again, as shown in the diagram below. You can then continue to the next receiver point, using the same sequence: click at the receiver position, then click on the left limit of the field of view and then click on the right limit of the field of view.

To enter a free-field receiver (ie with 360 degree field of view) then instead of clicking on the left-hand field of view, hold down the shift key and then click anywhere. You can now move on to the next receiver point.

When you have put in sufficient receiver points, right-click to terminate entry.



Measuring limits of field of view

The *Receiver Properties* screen will open. Click in the *Ident* box and type in the address of the receiver.

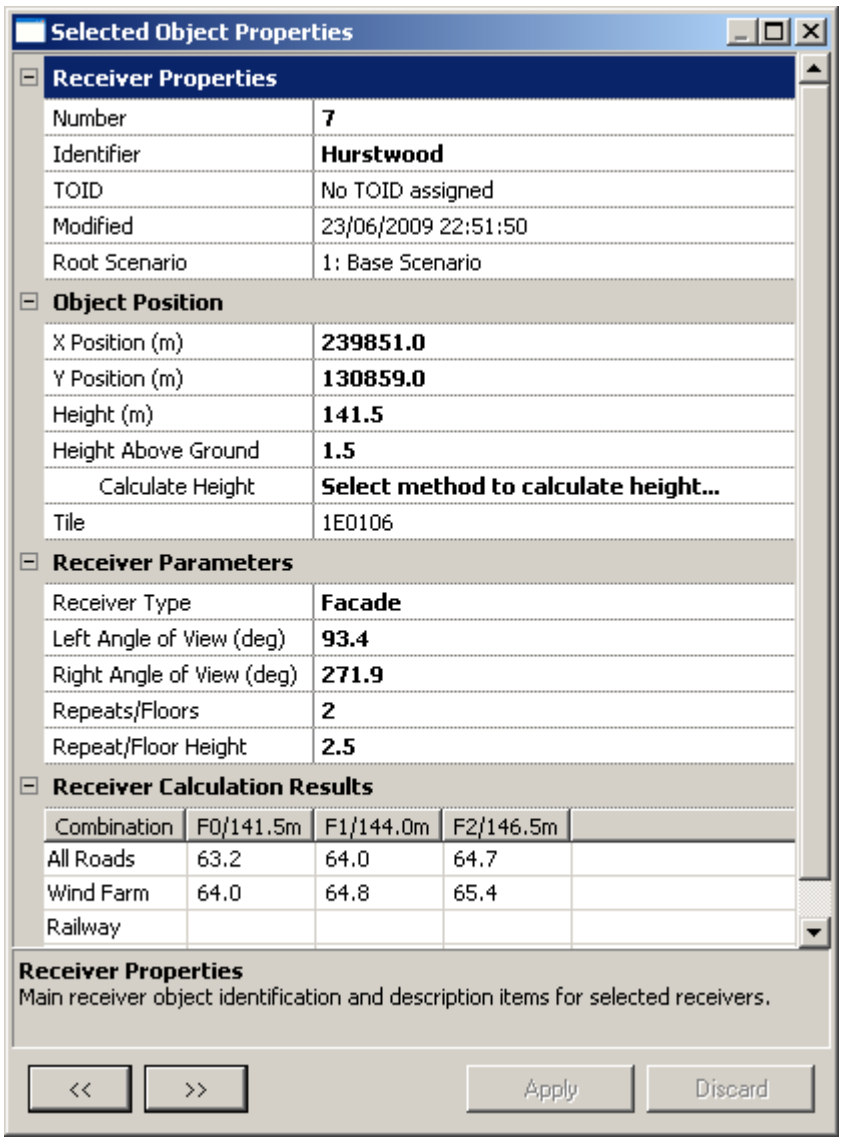
Next, put in the *Height of the receiver above local*, say 2 m to the top of the ground-floor window. Then click **Get height** so that *NoiseMap* uses the ground contour information to obtain the height above datum of the receiver.

If this is a façade receiver, set the **Receiver type** to **Façade**. This ensures that the facade reflection effect is included in the

calculation. If it is a free-field receiver, ensure that you set **Receiver type** to **Free-field**.

Finally, if you want to calculate noise levels at both ground and first floor, put in the *number of repeats* as 1, and the *Height per floor* (for example, 2.5 m). Then click **OK**.

RECEIVER PROPERTIES SCREEN IN DETAIL



Receiver properties screen

Receiver ID Number

The receiver ID is used to identify the receiver in printouts and on the graphical display. It is also used in the results database for processing by ROPORT. If the *NoiseMap* output is to be used in the optional ROPORT module ID must be a 4 digit integer. Even if ROPORT is not to be used it is good practice to use identification numbers to group receivers by area.

Identifier

The Identifier supplies an address for the receiver.

Co-ordinates

You can edit a receiver position manually, by typing new co-ordinates at the keyboard, or by the mouse or the digitiser. For facade receivers the calculation point entered is normally 1m in front of the facade.

Height

This is the height in metres of the calculation point above datum. (It is not the height of the ground at receiver position, but the height of the calculation point itself).

Height above ground

This is the height of the calculation point above local ground level.

Angles of view

The angle of view of the road from the receiver is usually limited. In a simple case, the facade itself might limit the angle of view to 180°, but it can be larger or smaller depending on circumstances. The angles defining the limits of view are measured relative to the positive Y-axis measured in a clockwise direction.

- **Left -** This parameter gives the left limit of view, which limits the angle of view to the left of the receiver position the reception point. The angle should be measured clockwise from the Y axis (or north point).

For a free-field receiver this parameter should be set to zero.

- **Right -** This parameter gives the right limit of view, to the right of the receiver position. The angle should be measured clockwise from the Y axis (or north point)

For a free-field receiver, this parameter should be set to 360.

Receiver type

CRTN88 defines two types of receiver

- Free field receiver
- Facade receiver

A free-field receiver is at a reasonable distance (say 3.5m) from a large reflecting surface such as a building facade or wall. A facade receiver is 1m in front of a large reflecting surface.

Select the appropriate choice using the left or right arrow cursor keys.

Number of repeats

As the calculation points in *NoiseMap* are often on facades of buildings, calculations need to be made at different heights for the same plan location. *NoiseMap* provides a facility to carry out repeat calculations without needing to re-enter data about the receiver position.

At each repeat, the height is incremented by the amount specified on the following box.

Height increment per floor

The difference in height between floors does not generally vary much over an area, so this parameter may only need to be entered at the beginning of each set of receivers. The value entered is the height in metres to be added to the receiver height for each repeat calculation.

Receiver calculation results

If you have downloaded the noise levels calculated for the receiver point, the results will be shown at the bottom of the receiver properties dialogue box for each floor level and each category combination. This result can also be coloured using View as colour and as a receiver label in the graphical display.

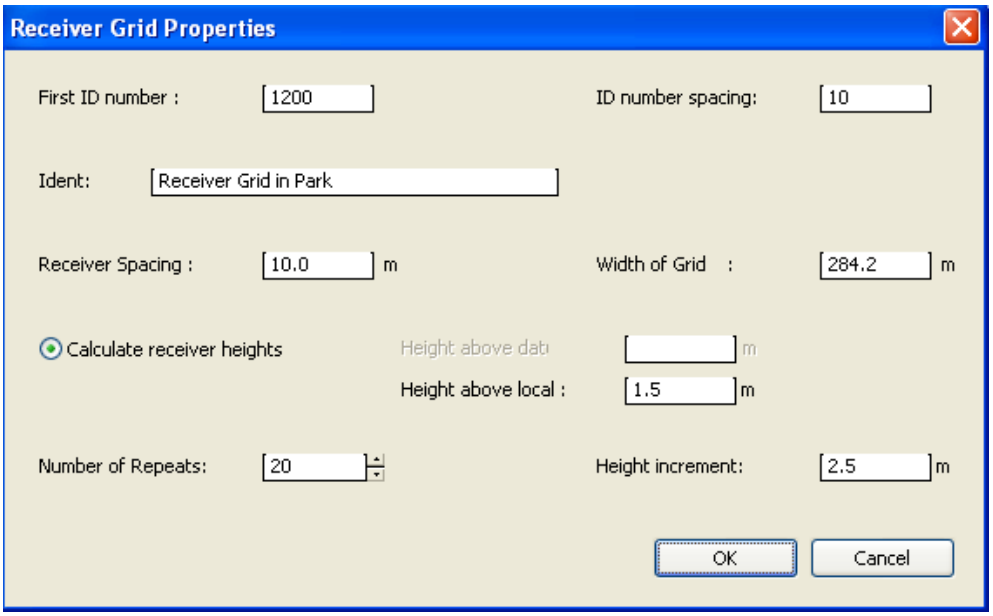
GENERATION OF A GRID OF RECEIVERS

A grid of receivers can be a useful alternative to noise contours, particularly where a small area is to be covered or where a vertical noise contour is required. The grid of receivers can be aligned at any angle and at any spacing, horizontal and vertical. By displaying the receivers as squares and by colouring them according to the noise level (using View-as-colour) noise contours can be produced. These can then be viewed in 3-d either by drawing cross-sections through the grid or by using the 3-d viewer.

To generate a grid of receivers, select **`Add Object`** and then select **`Receiver Grid`**. You can select automatically generate height, but at present, *NoiseMap* will only generate the height of the receiver grid from the ground model, and not from any other height information.

On the graphical screen, now click the point where you want one edge of the grid to be place and then move to the point where you want the other edge of the grid to be placed and click again. The line you have drawn will be the centreline of the grid.

Now the receiver grid properties window will open.



Receiver grid properties screen

You can adjust various settings as follows.

First ID number

This is the ID number of the first point in the grid. The ID of successive points will be incremented by the ID number spacing.

Ident

This is a label that will be added to each ID point to assist in identifying it.

Receiver spacing

The receivers will be generated on a square grid with the specified spacing. You should be aware that if the grid is large, you could have a very large number of receiver points if you make the spacing too close. *NoiseMap* can accept a very large number of receivers, but calculation time could get long.

Width of grid

The default value presented is equal to the length of the centreline that you drew, so if you leave the default value, a square grid will be produced, such that the baseline is in the centre of the grid. If the grid size is not an integer multiple of the grid spacing, the surplus receiver points will not be generated.

Calculate receiver heights

The receiver heights will be calculated either from the ground model (in which case adjacent receivers may be at different heights) or starting from the height above datum that you enter.

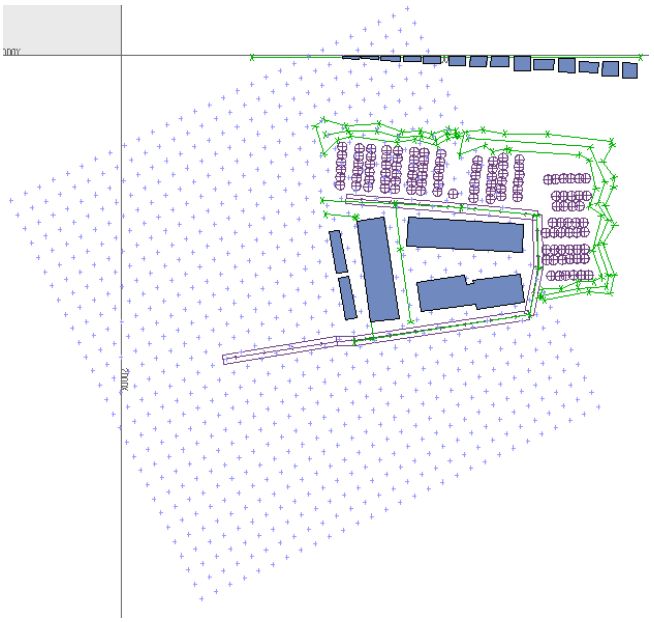
Number of repeats

This is the number of layers of receivers to be stacked above the base layer. If left at zero, only one layer of receivers will be generated.

Height increment

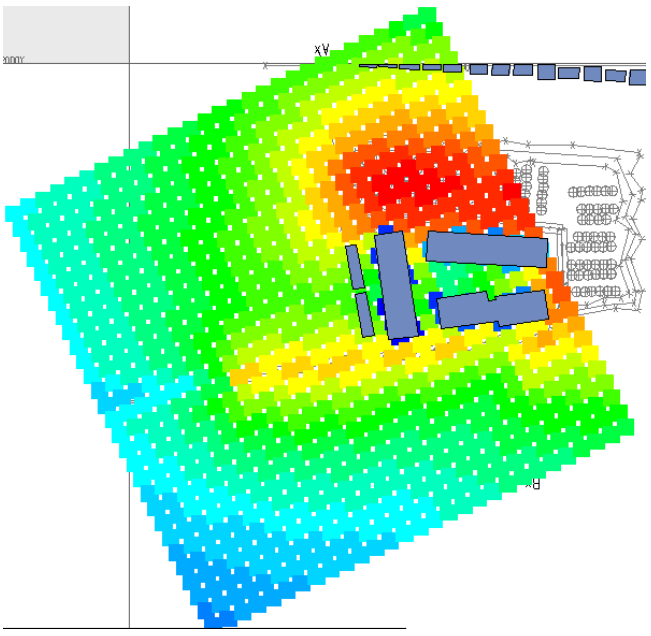
This is the height of each layer above the layer below it.

When you click **OK**, the receivers will be generated:



Example of receiver grid

You can then calculate the noise levels and display them in colour, either in plan or cross-section:



Receiver grid with noise levels displayed in colour

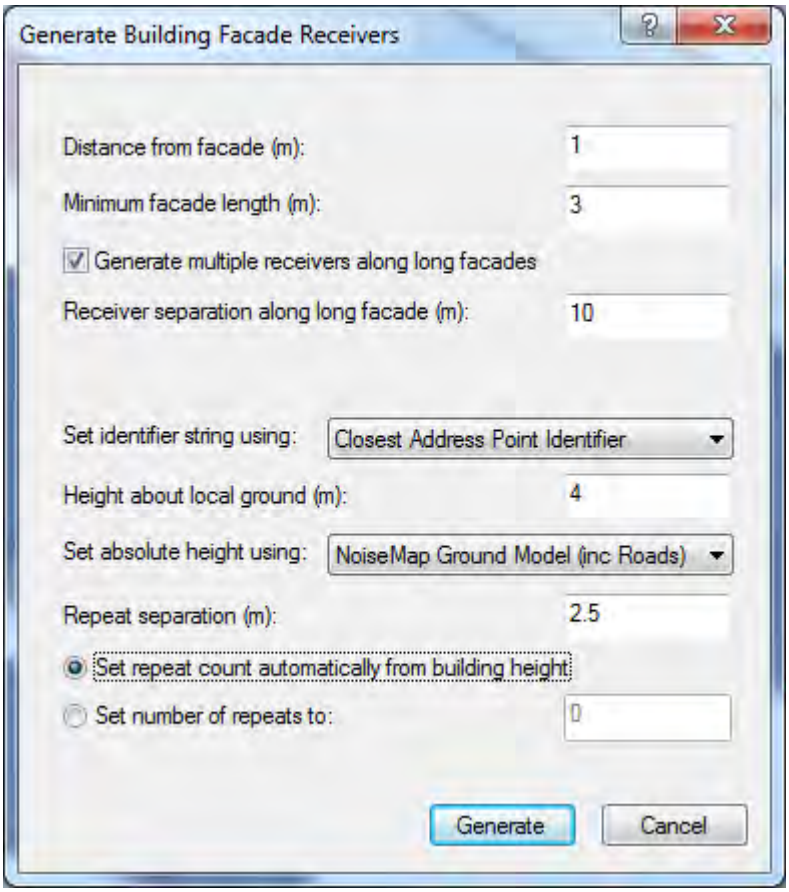
Vertical cross-section of Receiver grid with noise levels displayed in colour

AUTOMATIC GENERATION OF RECEIVER POINTS AROUND BUILDING FACADES

Certain types of noise assessment require noise levels to be calculated at building facades. One way of doing this is to position a receiver point on each façade of a building: on long facades, perhaps several receiver points might be needed to represent the noise exposure of the building.

NoiseMap can automate this process. The spacing of the points can be controlled by the user.

Select **`Edit`**, **`Outline tools`** from the menu and choose Generate Building Façade Receivers. The following dialogue opens:

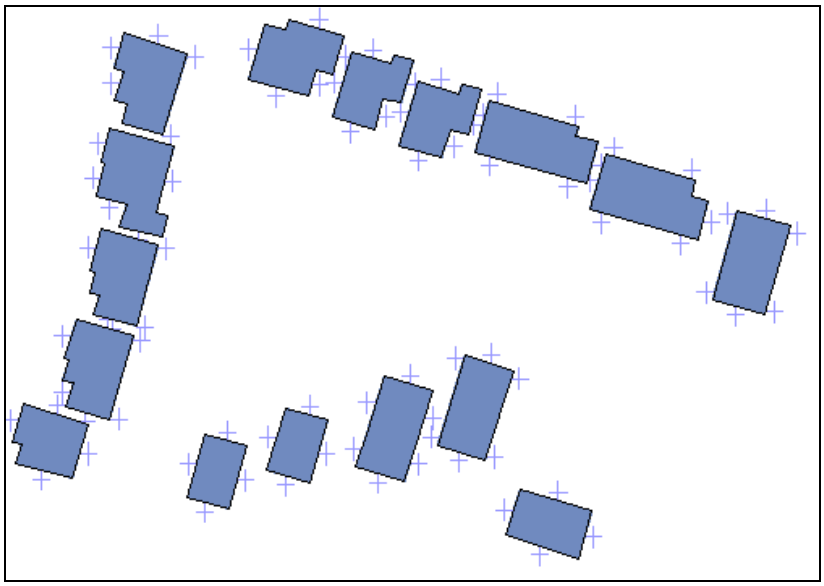


Generate façade receivers

The settings are as follows:

- Distance from façade – this is the distance of the receiver points out from the façade and is usually 1 m;
- Minimum façade length – set this long enough to avoid receivers being generated on short irregularities on a façade;
- Receiver separation – where you choose to generate multiple receivers on a long façade, set this to the maximum spacing between receivers;
- Set identifier string using – the options are: Auto-numbered identifier; Building Identifier; or Closest Address Point Identifier. A façade identifier (N/NE/E/SE/S/SW/W/NW) will also be added
- Height above local ground – this is the height of the first receiver point above the local ground level;
- Set absolute height using – select the method that *NoiseMap* is to use in obtaining the receiver height;
- Repeat separation – this is the vertical distance between receivers on multiple-floor buildings;
- Set repeat count automatically from building height – this will insert a receiver at each floor level (starting from the height above local ground) until the top of the building is reached;

- Set number of repeats to – this fixes the number of repeats, irrespective of building height; a value of zero will just calculate for a single receiver.



Receivers generated by above settings

Limiting the generation of receiver points

Receiver points are only generated for buildings in the tiles currently visible on-screen. Tiles that are loaded but not visible because you have zoomed in will be ignored. If any buildings are selected, then receivers will only be generated for those buildings.

Conversion to façade receivers

Note that by default, all the receivers are free-field. To convert them to façade values, using the Find function to select all free-field receivers and then use the edit function to set them to façade values. Note that all the receivers are set to 180 degree angle of view, but because of the barrier effect of the adjacent façade, this should not affect the accuracy of the result.

Receiver names

Receivers names are automatically generated as in the following example:

```
3, Random House, BF-1022-2.3, SW
```

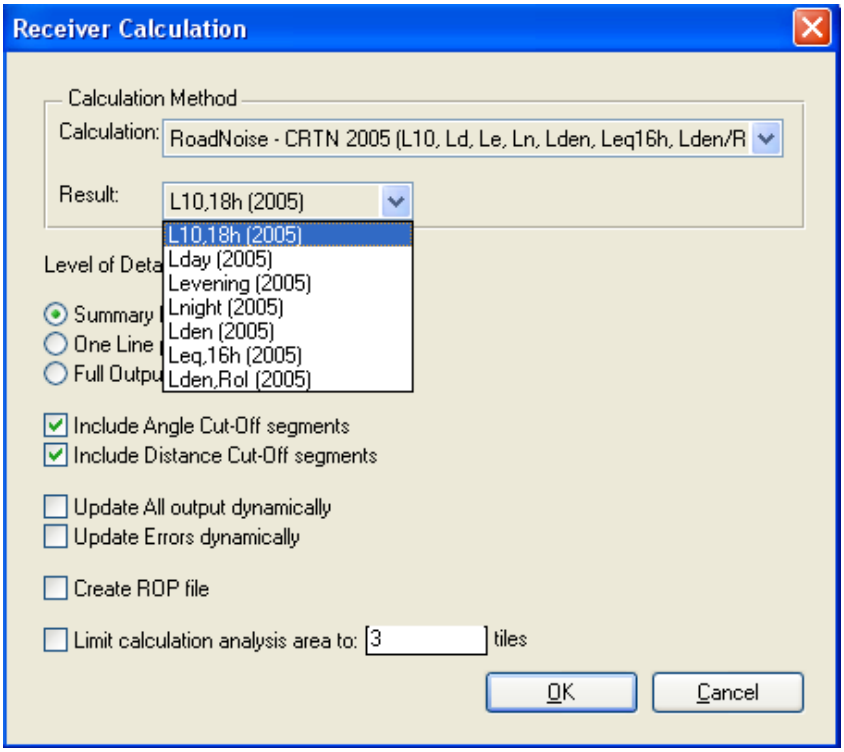
where BF indicates Building Façade, 1022 is the outline number of the building, 2.3 indicates the third receiver point on the second façade (numbered around the building outline). SW indicates the general direction in which the façade is facing. The address is taken from the Building identifier or AddressPoint identifier when this option is selected. The façade orientation is approximate to the nearest principal point of the compass.

CALCULATING NOISE LEVELS AT RECEIVER POINTS

When calculating noise levels at receiver points, you have the option of doing the calculations on your local computer and storing the results locally (the classical method), or of calculating the results and storing them in the database. With this option, you can add the calculations to the queue and then any computers listening to the calculation queue can share the work.

LOCAL CALCULATION

Select **`Calculate`**, **`All Receivers`** from the main menu. A dialogue box will appear, giving various calculation options.



Local calculation of receiver noise levels

Calculation method

Select the calculation method from the drop-down list.

RoadNoise

The Road calculation options only calculate for highway-type road sources. Rail and Site sources have their own calculation procedures. For *RoadNoise*, the calculation will depend on the periods covered by the traffic data – which can be 18-hour, day/evening night or 24 by 1-hour periods. Using this data, the calculation options are:

***RoadNoise* CRTN All 2005**: This calculates L_{10} using the standard CRTN calculation method and then applies adjustments to obtain L_{den}, L_d, L_e, L_n, L_{eq} 16-hour and L_{den}(ROI) (methods A or B). The L_{den} calculation and its components are calculated according to the method advised by Defra/TRL in 2005.

***RoadNoise* CRTN 2003:** This calculates the same parameters as *RoadNoise* 2005, but using the slightly different method

for converting L_{10} to L_{den} originally advised by Defra/TRL in 2003. It is retained for backward compatibility but should not normally be used.

***RoadNoise* Leq** – the Noise Advisory Council L_{Aeq} method. This method does not give the same results for Leq as the 2005 method and is no longer widely used

It is recommended to choose the *RoadNoise* CRTN 2005 method in normal cases, as this also includes the CRTN L10 method. *See also the discussion on p. 10:1*

NRA/RoI Methods A and B – The National Roads Authority of the Republic of Ireland publishes Guidelines for the treatment of Noise and Vibration in National Road Schemes. The Guidelines give two methods, A and B, for calculation of Lden, with method A (the preferred method) requiring the calculation of 24 1-hour L10 values from 24 1-hour traffic flows, and method B requiring the calculation of the L10 (18-hour) from the 18-hour traffic flow. The Guidelines give formulae for converting these values to Lden. Atkins has produced a research paper which shows that when the *NRA's standard diurnal traffic flow profile* is used, Methods A and B produce very slightly different results, but the Method B results can be converted to Method A results by the application of a simple formula, to give an identical result within calculation tolerances. This means that it is unnecessary to enter the 24 1-hour traffic flows in order to use Method A, as long as the standard traffic profile is applicable (which is true in almost every situation).

RailNoise calculation methods

There are three options for *RailNoise* calculations

- CRN Leq – calculation of the Leq index in accordance with 'Calculation of Railway Noise 1995' and subsequent addenda;
- CRN Lmax – calculation of the Lmax index in accordance with the TNPM system used for the Channel Tunnel Rail Link
- CRN LAeq (TNPM) calculation of the Leq index in accordance with the TNPM system used for the Chaneel Tunnel Rail Link.

The TNPM methods are specialist procedures and full details are given in a separate manual available from NoiseMap Ltd.

The Leq index uses the measurement time to be set via the **`Parameter, Edit Calculation Parameter`** dialogue. The same dialogue is used to set up the cut-off distances, angle of view and calculation precision.

SiteNoise calculation methods

SiteNoise calculations are made in accordance with BS5228:1997. Various enhancements to the standard method can be selected via the **`Parameter, Edit Calculation Parameter`** dialogue. These are described in a separate manual available from NoiseMap Ltd. The same dialogue is used to set up the cut-off distances, angle of view and calculation precision.

Result

This drop-down list will show the various calculation indexes that are available for the calculation method you selected. Choose the one you require. You can only selected one of the available indexes when calculating for individual receivers.

Level of detail

You can choose between:

- Summary printout

  This only gives the value of the chosen noise index, with no breakdown of the calculation process

- One line per segment

  This summarise the most important intermediate values and the total contribution of noise from each segment

- Full output

  This provides a detailed analysis of the calculation for each segment. It may be helpful for trouble-shooting, but should only be chosen for small examples.

Include angle-cut-off segments
Include distance cut-off segments

This can be useful when using one line per segment output to check which segments are being omitted as a result of your calculation settings under Global parameters.

Update All Output dynamically
Update Errors dynamically

These settings may be helpful on slow computers where you wish to watch the output screen in real time. They should be left unset on faster machines.

Create ROP file

A ROP file is a fixed-format output of the summary results for a calculation, which is useful when transferring the results to other software (such as a spreadsheet) for further processing.

Limit calculation analysis area to n tiles

This limits the number of tiles that are searched when *NoiseMap* is looking for noise sources. It is useful as a speed-up device when you have downloaded a model covering a large number of tiles. **You should note that this does NOT cause *NoiseMap* to download additional tiles from the database to provide the requested surround. It simply limits the search radius within the tiles already downloaded.** This means that you must make sure that you download a sufficient area of the noise model before starting the receiver calculations.

For example, suppose you have downloaded a model covering a block 10 km by 10 km but your receiver cut-off distance is 1 km, you may wish to limit the search radius to 3 tiles. If each tile is 0.5 km square, then any source within 1500 km radius will be considered. However, it will only be necessary to search 7 times 7 = 49 out of the total of 20 by 20 = 400 tiles, greatly reducing calculation time. You should bear in mind that CRTN uses the *perpendicular* distance to calculate the distance cut-off, and a segment which is at a great distance on the radius could be pointing straight at the receiver, so its perpendicular distance could be small. However, in this case its angle of view will also be small, so its contribution of noise will be small as well.

Click **OK** to run the calculation. Individual receivers are always calculated on the local machine – there is no facility for a distributed calculation, nor for storing the results in the database.

The results will be displayed in the All Output window. You can also display the results alongside the receiver points. Click **View, Display options** from the main menu and click the **Labels View** tab. Click the Receiver Labels check box and the Advanced Recs button. Check **Result for receiver** and click **OK** to return to the graphical screen. The result will be displayed alongside the receiver.

CALCULATE DATABASE RECEIVERS

You can only calculate database receivers for database versions of 3.81 (software versions 4.0.13) and above. Select Calculate Database Receivers from the Calculate menu. Then:

- select the tiles that you wish to calculate
- select the calculation method (for more details, see under Local Calculation above)

Then choose either:

- Queue Distributed Calculation – this adds the selected calculations to the calculation queue; or
- Perform Local Calculation – this undertakes the calculation on your own computer.

In both cases, the results are stored in the database. The calculation detail or receiver results are not shown when you calculate database receivers, because it is assumed that you will be doing a large number of calculations in a batch run and will not therefore wish to check individual results. You must download the results from the database if you wish to view or export them.

LOAD RECEIVER RESULTS

This lets you download from the database the results of calculations at individual receivers.

Viewing receiver noise levels

When you have downloaded the receiver noise levels, these will be shown in the Receiver properties window for each floor level and each category combination. You can also view them on screen using view as colour and you can label the receiver points with the calculated noise level. You can produce a table of results in the Output screen by selecting to Display receiver results, see below.

DISPLAY RECEIVER RESULTS

When you have downloaded receiver results, you can display them in the output screen by selecting **`Calculate, Display receiver results`**.

EXPORT RECEIVER RESULTS

When you have downloaded receiver results from the database, you can export them to an external file. This file is in CSV (comma-separated value) format that can be read by Excel and other software packages. All the downloaded results are exported unless you **select** some receivers, in which case only the selected receivers are exported. You could use this in combination with the Find command to export receivers with certain noise levels.

SHOW SOURCE CONTRIBUTION AT RECEIVER

This will show the contribution of noise at a selected receiver from each source. First, select one receiver in the graphical window. Then choose the category combination and receiver floor level for which you require the source contributions. These must be chosen from values already in the model. The calculation will be run and the sources will be colour-coded according to their relative contributions, from blue for the source contributing least, to red for the source contributing most noise.

This can be used as part of the model verification process to check that the various sources are contributing the expected amounts of noise, as it is much quicker that plotting a noise contour.

12. SAVING AND EXPORTING RESULTS

EXPORT SHAPEFILES

ShapeFiles are an ESRI (ArcView) Geographical Information System file format that contains both the geographical location of objects and also their attributes or properties. A shapefile usually consists of more than one file: one contains the geographical data whilst the others contain the attribute data.

NoiseMap exports both the geographical and attribute data. The attributes depend on the type of object that the shapefile represents and are detailed below. All the *NoiseMap* attributes of an object are exported. The description and order of the attributes are given below. This order can be used as a default when importing shapefiles into *NoiseMap*, so that a shapefile exported by *NoiseMap* can be directly re-imported (it can be round-tripped).

To export a *NoiseMap* model as a shapefile, proceed as follows.

Select from the menu **`View`**, **`Export shapefile`**

Choose the object to export

- Ground Contours
- Road segments and flows
- Rail Tracks
- Site Workings
- Barriers
- Building Outlines
- Receivers

Shapefile root

Next you must select the name to be used as the shapefile root. The root will be extended by a suffix denoting the type of shapefile and by a file extension name denoting which component of the shapefile it forms. For example, if you choose the root essex, then, depending on the type of shapefile you are exporting, the shapefile name could be:

- EssexRoad
- EssexBld
- EssexBar
- EssexGnd

For each type of shapefile object, three files will be exported, with the filename extensions of:

- .shp
- .shx
- .dbf

Shapefile attributes

The attributes of each shapefile depend on the type of object that it represents. They are fully described in Appendix 1.

The shapefile information includes the TOID of the object. You will need to ensure that you have downloaded the TOIDs before you can export a shapefile: see Edit Program Defaults, p. 4:40

EXPORT PICTURE

You can save as a bitmap a contour displayed on screen. Firstly load the contours that you require. Then choose **`Calculate`**, **`Export Picture`**.

A dialogue box will let you choose the resolution (the number of pixels) of the bitmap to be exported. Unlike copying the view to the clipboard (see below) the resolution is not dependent on your computer display, so it is possible to obtain high-resolution images. The bitmap will be square and will include all the tiles that are visible on-screen when you export the picture.

Bit-map is an uncompressed format suitable for further graphics processing.

JPEG is not supported natively in *NoiseMap*. If you require a JPEG or other image format, you should export a high-resolution bit-map and then process in a suitable image processing package, such as Paint, which is supplied with Windows.

COPY VIEW TO CLIPBOARD (CRTL + C)

You can capture the current *NoiseMap* window to the Windows Clipboard with the shortcut key combination Ctrl + C. This is similar to the Windows Print Screen function, but captures only the *NoiseMap* Window rather than the whole screen. This will be captured at the resolution of your computer display.

EXPORT DXF

`View, Export DXF` will export the current *NoiseMap* model in DXF format, including any noise contour which is open at the time. You can choose whether the model is to be exported with or without object heights, i.e. a flat model or a 3-D model.

By default, a title and border box with co-ordinates will be included in the export. As an option, you may exclude this detail.

The DXF export will include those objects shown on-screen when the export is performed. For example, if you only wish to export the road segments, switch off the other objects first, by using **View, Display options**. Any label settings will also be reproduced in the export. If object heights are selected, each receiver repeat can be output as a separate symbol.

Objects are exported with their current colour settings. If View-As-Colour is selected when you export the model, then the objects will be exported with the colours applied, and the View-As-Colour key will be included.

Note that any currently-loaded bitmaps and imported DXF files are not re-exported. Road, rail and haul segments and building outlines are always exported in outline rather than as filled objects. However, receivers are exported as filled squares if that is their current setting.

EXPORT CONTOUR DATA

Calculate, Export Contour Data allows you save to an external file the grid of noise levels used to create the current contour. This does *not* export the actual *contour lines* themselves. For this, you need to go to **View**, **Export DXF** (see above).

COMMA-DELIMITED ASCII OUTPUT

- To export the grid of noise levels, select **Calculate**, **Export Contour data**. The ASCII Export dialogue box will open and you will need to give a descriptive line for the file and choose the Export Format from the following options:
- **X,Y, Absolute Height, Level**: One line for each grid point containing its grid co-ordinates, its absolute height above datum and the noise level;
- **X,Y, Local Height, Level**: One line for each grid point containing its co-ordinates, its height above local ground and the noise level;
- **X,Y, Level**: One line for each grid point containing its co-ordinates, and the noise level; all points have the same height above local ground, given in a comment at the top of the file.

In addition to the above information, the ASCII file contains the following comments:

- Name of Master file or Archive used to generate contour & Name of category combination calculated;
- Comment line for contour
- Calculation method (eg L_{Aeq} or L_{A10})
- Export format of file.

The file is in plain ASCII comma-delimited format, ie commas between the values on the line, with semi-colons (;) to denote comment lines. Values are given to one decimal place of precision. This format can be read and created by a wide variety of software.

Output comma-delimited results in full grid form

The comma-delimited ASCII output (described above) will output the results in the currently-loaded tiles, whatever the shape of the area. If you require the output to cover a full rectangular shape, then check this box. *NoiseMap* will then fill any missing tiles with 'no data' values (ie the value -9999.0 dB), to form a complete rectangle. (NB: this is always done for the ESRI grid output described below, so this box has no effect with ESRI option.)

Points within tiles that have been contoured, but where no noise level is available (for example, beyond the calculation cut-off distance) are assigned a null value of -99.0. *Note that this distinguishes from the 'no data' value of -9999.0.* For points that fall within buildings, see below.

ESRI GRID FORMAT

An alternative output format is the ESRI Grid format, which can be imported by various GIS systems. Firstly load up the contours that you wish to export: these can cover as many tiles as you wish, within the capacity of *NoiseMap*, and need not be a rectangular area, although the ESRI grid will always export a rectangular area. Any tiles outside the contoured area will be exported with a 'no data' value for the points within them.

Hint: Importing ESRI Grid results into ArcView Raster format
In NoiseMap, download the required contours and then select Calculate, Export Contour Data, and select ESRI ASCII Grid Format. Export the contour data and add the letters 'asc' as the extension to this newly created file.

Open ArcMap (ArcViewer software). Go to 'Window' in toolbar. Click on ***Arc Toolbox****, then* ***Conversion Tools****, then* ***To Raster*** *and finally* ***ASCII to Raster****.*

Points within buildings

CRTN cannot calculate noise levels inside buildings, so any points that lie within a building envelope are stored in the database with a 'null' value (ie -99.0). To prevent the contouring routine from producing undesirable edge effects where a contour boundary meets the building envelope, by default *NoiseMap* interpolates for noise levels within the building, although the interpolated values are not visible when the buildings are drawn as filled outlines. It is usually desirable to export the non-interpolated ASCII grid containing these null values if further mathematical processing is intended, but for visual presentations it is better to use the interpolated grid which will give a continuous image.

To export the uninterpolated (raw) values, you must uncheck the Interpolate null results inside buildings check-box when downloading the noise contour data.

EXPORT ARCHIVE

You can export the *currently-loaded* model as an archive that can be saved as a backup, or to transfer data into *NoiseMap* Enterprise, or for creating a new *NoiseMap* database. There are memory limitations on the size of models that can be saved or transferred using the archive system. When transferring to Enterprise, it will only be possible to use those objects that are defined for the relevant module. For example, you cannot use building outlines in Enterprise.

If you need to backup or transfer large models, it will be better to backup the database and transfer this to the new location. You can use the Database Administrator for this purpose.

To export an archive, select **File**, **Export Archive**. Choose the export option you require by selecting the appropriate radio button:

- *NoiseMap* Archive (file type .nma)
- *RoadNoise* Enterprise Edition Archive (file type .rna)
- *RailNoise* Enterprise Edition Archive (file type .tna)

When you select one of the Enterprise Edition options, only objects relevant to that module will be exported. If a bitmap is open, then this will be recorded, and when the archive is opened NoiseMap will also try to load the bitmap. However, the bitmap itself does not form part of the archive. If you want to supply the archive to another user, you must also send them the bitmap file (.bmp file) and the calibration information (.rnb file).

Note that Noise Contour information is *not* exported as part of a NoiseMap five archive. You must use one of the other Noise Contour Export options for this. [If a noise contour is loaded, this is exported as part of a NoiseMap Enterprise archive, but it can only be accessed in a NoiseMap Enterprise module.]

Choose the filename and location for the archive file and add a comment which will be recorded as a TEXT comment in the archive. You can also select a different origin from the original co-ordinates.

Click **Export** to start the export process.

EXPORTING A SCENARIO

After working on a scheme for some time, you may have a large number of redundant scenarios that are no longer required. *NoiseMap* does not have a function for deleting or compressing scenarios. However, you can export a scenario and then import

this into a new database, thereby allowing you to start from a fresh base.

To do this, you should load the scenario of interest and then export it as an archive. On large schemes, you may not be able to export the whole scheme in one go. In this case, you can divide the whole scheme into a number of named areas and export it in a number of chunks. See *Import Existing Archive* on how to import the Archive into a new database.

EXPORTING TRAFFIC FLOWS

You can export traffic flows to a plain ASCII file that is saved in CSV (comma-separated values) format. This can be read into a spreadsheet such as Excel.

To export traffic flows, select **Parameters**, **Export Traffic Flows** from the menu and choose a suitable file name and folder to receive the file.

For an explanation of the format and content of the output file, see page 6:6, 'Importing traffic flows from a spreadshseet'.

EXPORT TRAIN VEHICLES

You can export Train Vehicle data to a plain ASCII file that is saved in CSV (comma-separated values) format. This can be read into a spreadsheet such as Excel.

To export train vehicle data, select **Parameters**, **Export Train vehicle data** from the menu and choose a suitable file name and folder to receive the file.

The first line of the spreadsheet will contain a heading describing the columns to aid readability, laid out as shown below.

VEHID	NAME	VTYPE	VCORR	SRCHEIGHT	SPDCORR	VCORRFP	SRCHEIGHTFP	SPDCORRFP
1	Diesel Loco	TVT_DIESEL	14.1	0	0	0	4	0
2	Rolling stock	TVT_NORMAL	6	0	0	0	0	0

Train vehicle export format

VEHID is the vehicle ID number used in *NoiseMap*. If you wish to update the vehicle information in *NoiseMap*, then leave the Vehicle ID unchanged and modify the other parameters. The re-import the spreadsheet. Existing vehicle IDs will be updated by the new values imported from the spreadsheet and new vehicle IDs will be added to the database. Note that each database can only have one set of train vehicle data and that any changes you make will appear in all scenarios in the database.

See index for information on the definition of the train vehicle parameters in the table above.

EXPORT PLANT

You can export Plant data to a plain ASCII file that is saved in CSV (comma-separated values) format. This can be read into a spreadsheet such as Excel.

To export plant data, select **Parameters**, **Export Plant** from the menu and choose a suitable file name and folder to receive the file.

The first line of the spreadsheet will contain a heading describing the columns to aid readability, laid out as shown below.

PLANTNUM	NAME	SRCTYPE	SRCLEVEL	HEIGHT	F315	F63	F125	F250	F500	F1000	F2000	F4000	F8000
1	Turbine	PST_SWL	103.1	86	0	0	0	0	0	0	0	0	0
2	Land-rover	PST_SWL	90	0.5	0	0	0	0	0	0	0	0	0
3	Excavator	PST_LAMAX	91	1	0	0	0	0	0	0	0	0	0
4	All-terrain vehicle	PST_LAMAX	85	0.3	0	0	0	0	0	0	0	0	0

Plant export format

PLANTNUM is the Plant ID number used in *NoiseMap*. If you wish to update the plant information in *NoiseMap*, then leave the Plant ID unchanged and modify the other parameters. Then re-import the spreadsheet. Existing plant IDs will be updated by the new values imported from the spreadsheet and new plant IDs will be added to the database. Note that each database can only have one set of plant data and that any changes you make will appear in all scenarios in the database.

See index for information on the definition of the plant parameters in the table above.

SAVING THE OUTPUT WINDOW

The Results Output Window can be saved to a file or you can copy it to the clipboard and paste it to another application.

Select **File**, **Save As** from the main menu bar. You will be asked to supply the name of the output file. This will be given the file type .OUT by default.

RESULTS REPORT (ROP) FILE

A ROP file is a list of results in a format that can be imported into a spreadsheet or other application for further processing. You can only choose to generate a ROP file when you calculate at individual receiver points.

EXPORTING TO EXCEL

The Comma-separated Value (CSV) files generated by many *NoiseMap* export functions can be opened, edited and saved in Excel. This can provide a handy way of editing *NoiseMap* files externally.

The attribute part of shapefiles (with the .dbf type) can also be opened and processed in Excel.

13. FEATURES FOR CHECKING MODELS

CHECKING AND VERIFICATION

Checking and verification is an essential part of any noise modelling process. NoiseMap has been designed to help users to build noise models correctly from the start, but it is still essential to check the model thoroughly before starting long calculations and applying the results.

The main checking tools are as follows:

There are many other automatic checks built into the calculation process which will bring up an error message either on-screen or in the output log window (which should always be checked). These messages are intended to be self-explanatory and are not detailed here.

VIEW-AS-COLOUR

View-as-colour allows you to view the model with chosen parameters colour-coded. For example, you can colour-code objects according to their height, ranging from blue as the lowest, through green and yellow to orange and red as the highest.

To view as colour, select this option from the View menu and complete the dialogue box as follows.

View-as-colour On

Check this box to activate the View as colour feature.

PARAMETER TO COLOUR

Object type

Click on the drop-down list to select the type of objects you wish to colour. You can select **All** types of object, or any one type.

(Special objects are used for segment contributions and cannot be selected manually.)

Object Parameter

When you have selected the type of object to view as colour, you will see a list of parameters applicable to those objects. You can only view heights in colour when you select **All** types of object. If you do not want to see all types of objects coloured, then switch the unwanted types of object to Grey, or Off altogether, from the **`View, Display options`** menu.

PARAMETER OPTIONS

These options are only operative when viewing certain parameters, and will be greyed-out if not applicable.

Train service to show

This is operative only when viewing Train Services, and lets you choose which service is to be selected when there is more than one.

Activity to show

This is operative only when viewing Activities, and lets you choose which activity is to be selected when there is more than one.

Result for combination

This is operative only when you choose to view receiver results in colour, when you must select the category combination of the results you require.

Result for floor

This is operative only when you choose to view receiver results in colour, when you must select the Floor Number (ie Repeat Value) of the results you require.

COLOUR SCALE LIMITS

Minimum

Maximum

This shows the range of values that will be coloured, from blue to red. *NoiseMap* automatically adjusts the range of values to suit the chosen objects, but you can enter your own choice of lower and upper limit, perhaps to standardise the colours or to view a restricted range with more precision. Objects with values outside the chosen range will be coloured black or white to contrast with the chosen display background.

Objects which do not have a particular value will be shown in grey. For example, Ground Outlines do not have a height property, so will be greyed-out on a height plan.

UPDATE VIEW

Click this button to view the effect of changes whilst keeping the dialogue box open. Click **`OK`** to close the dialogue box whilst

keeping View-As-Colour active. To deactivate View-As-Colour, uncheck the View-As-Colour option at the top of the box.

LABELLING THE MODEL

You can select which objects are visible in the graphical display and you can label them with selected parameters. These features are accessed from the **`View, Display options`** menu.

DISPLAY OPTIONS MENU

The Display Options menu has three tabs:

- Types View
- Labels View
- General

TYPES VIEW

This enables you to select the display mode of each type of object. For most objects, the following modes are available:

- **On** – the object will be displayed in colour and can be selected
- **Grey** – the object will be displayed in grey and cannot be selected
- **Off** – the object will not be displayed

Note that if an object type is Grey or Off, it will also be greyed out in the Add Object dialog, as it cannot be added manually.

In addition, Roads and Building outlines can be shown just as outlines or as filled objects. Building outlines can be made selectable, which then allows them to be moved or deleted. The point markers on contours can be hidden to make crowded contours easier to see, although it is then more difficult to select their end-points.

You can indicate the direction of flow of traffic on roads by checking the **Flow Direction** box.

Detailed indicates railway lines with cross-sleepers (to a notional width) and **Join chains** will neatly mitre the corners of rail and workings segments.

Outline types: allows you to select which types of outline are displayed (Buildings, Areas, Lines, Annotation, etc)

Representation of receiver points

Three check-boxes allow you to:

- Display the actual angle of view of receivers when selected
- Display receivers in a lighter shade of blue for easier viewing

- Display receivers as filled squares, which can be specially useful when colouring receivers according to the calculated noise level. A slider allows the size of the filled squares to be adjusted.

Working Options

You can select the display width of mobile routes and fixed workings to improve display clarity. It does not affect the position of the noise source, which is at the centre of the object.

LABELS VIEW

This enables you to select which types of object will be labelled in the graphical screen. You can also select which properties of each type of object will be shown in the label. This avoids the graphical screen becoming cluttered with unnecessary details. Further options to reduce clutter are to select the check boxes to truncate labels on short elements and only to label objects when selected.

You have three preset options:

- **None** – No labels
- **Short** – ID numbers only
- **Long** – Includes heights and some other information.

Advanced Recs allows you to label receivers with their calculated noise level. Use View-as-colour to colour the receiver markers according their noise level.

Advanced Road gives options for labelling additional road segment properties.

Outline types selects the types of outline to be labelled.

Orientation

This lets you set the direction of labelling. The options are:

- Along the line of the object;
- Horizontal
- Vertical

Where there are many objects close together, choosing horizontal or vertical may avoid the labels running into each other.

Format

Format options let you control the amount of detail on crowded models. The options are:

- Use multiple lines for secondary labels (Services/ activities);
- Truncate labels on short segments;
- Only label currently selected objects.

GENERAL

This controls a number of settings for the graphical display. These include:

- Set rotation angle of display
- Show or hide the grid (also controlled by grid button on tool bar)
- Set grid size.

Screen Parameters

- Screen background colour (black or white)
- Size and thickness of lines and labels
- Alternate add objects cursor (use if normal cursor is invisible on certain background) .
- Software fill of noise contours
- Report GINO errors (GINO is the graphics driver)

Printer parameters

- Size and thickness of lines and labels
- Colour of labels and maps (for use with monochrome printers)
- Thickness of characters in title box (can avoid problems with pen plotters)
- Size of grid labels

CROSS-SECTIONS AND LONG-SECTIONS

Selecting Cross-section function

NoiseMap can draw cross-sections over any number of section lines. The cross-section function is located on the menu bar under the **`Calculate`**, **`Draw Cross-section`**.

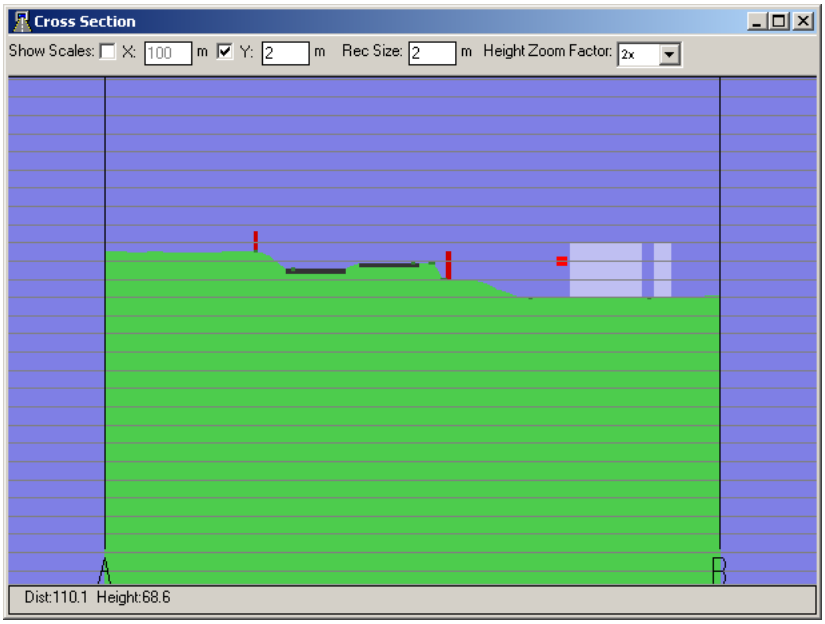
When you have selected this function, you left-click on the plan view where you want the cross-section to start and then, using the guideline that appears, position the end point of the cross-section and left-click again. Right-click to terminate the cross-section, which will then appear in a separate window. You can have several cross-sections open at once if you wish.

Drawing Long-sections

Long-sections are produced in exactly the same way, except that when you have left-clicked at the first way-point, you position the mouse over a second way-point and left-click again. Repeat for as many way-points as you require. When you reach the last way-point, right-click to terminate the section and produce the picture.

Ground height evaluation

You will be asked whether you want a *Pure CRTN-style Cross-Section* or a *Calculated Height Cross-Section*. This choice relates to the way that the ground heights are calculated along the section. With the CRTN method, the ground heights are only calculated where the section line crosses a ground contour line, whilst the Calculated Height method calculates heights at regular intervals along the section line. The two methods may give slightly different ground profiles in cases where the ground topography is complex: this could be an indication that additional ground contour or profile points need to be added to the model.



Cross-section view

The Cross-section Display

In the cross-section display, the way-points are labelled in alphabetical order A, B, C and so on. You can display a graticule over the section by ticking the 'Show scales' boxes at the top of the window. By default, these are shown at intervals of 100 m horizontally (X) and 10 m vertically (Y). Note that the graticule does not display the actual co-ordinates of the cross-section – it is there to assist in judging distances. The X, Y values at the cursor position are shown at the bottom of the window.

The cross-section is scaled to fit within the window, and when viewing large models, it may become difficult to distinguish small differences in the height of objects. To make the differences easier to distinguish, you can exaggerate the vertical scale by factors of 2 times, 5 times and 10 times.

You can also zoom the view with the Page Up and Page Down keys, and then use the cursor keys to scroll the view up, down and sideways.

Roads are shown as black horizontal lines, barriers as red vertical lines, and buildings as grey blocks. In *SiteNoise*, haul roads are

always shown at a nominal width of 5 metres, although the source line is always at the centre of the track. Point sources are shown as thin, flat squares 2 m across. The actual source is at the centre of the square. In the Cross-sectional view, the point sources will be displayed when they fall within about 2 m of the section line. Hover over any item to see its properties in the status bar at the bottom of the window.

Display noise levels

Receiver points within about 2 m of the cross-section line will be shown as blue squares. If you have calculated noise levels at receiver points, you can choose to have these coloured according to their noise level, based on the ISO 5 dB scale.

VERTICAL NOISE CONTOURS

If you have calculated the noise levels on a regular grid of receivers, you can produce a vertical noise contour by drawing a cross-section through the grid of receivers. You need to set the receivers so that they are shown as square blocks and then to set view-as-colour to colour the receivers in accordance with the noise result you wish to view.

3-D VIEWING

The 3-D viewer is a multi-purpose tool that allows any model to be seen as solid colour model. Amongst the applications are:

- checking ground topography of model
- checking heights road and rail segments, other noise sources, buildings, barriers and receivers
- checking for correct position of embankments, cuttings, barriers, and receivers
- understanding complex 3-D models
- assessing the relative height and position of barriers as part of a barrier optimisation process
- viewing the noise contours and façade receiver noise levels 3 dimensions
- presenting results to lay audience

Any noise model can be used for 3-D viewing, but unless it contains some ground contours or profiles, the result will be difficult to interpret.

The viewing procedure is in two stages:

- create the 3D model and save it as an archive
- start the 3D viewer

Standalone mode

The 3-D view is generated from within *NoiseMap*: there is no need to start another application. However, the 3-D viewer is a separate application and lets you view an existing 3D model without having the full *NoiseMap* software or dongle installed. This can be useful for on-site demonstrations, public exhibitions and such.

The 3-D viewer has been completely revised to give more realistic and reliable 3-D viewing on modern computers.

GENERATING 3-D FILES

Before starting to generate the 3-D view, download the tiles covering the area of interest. The larger this area, the longer it will take to generate the view. If you want to view the noise contours or receiver noise levels in colour, you should calculate and download these before generating the 3D files. They cannot be added later. Also select a receiver point on the map, if you wish to have a particular starting point for the view. You can now start to generate the 3-D view.

Select **`Calculate`**, **`Generate 3D files`** from the main menu. Give the name under which you want the 3-D Archive to be saved. If you have selected a receiver as the initial starting point of the view, now select the floor level and direction of the initial view. The options are:

- North
- Centre of angle of view from receiver
- Towards closest segment
- Towards loudest segment. (only if you have calculated segment contributions)

Choose your preferred option and click **`OK`**.

Colour receiver points by noise level

The receiver points will be shown in the 3D model as small cubes. If you have calculated the noise levels at the receivers, you can choose to colour the receiver points according to their noise level. You can choose which category combination to display.

The colours are the ISO standard 5 dB step values. These are:

Noise level	Colour
Below 35	Light green
35 - 40	Green
40 - 45	Dark green

Noise level	Colour
45 - 50	Yellow
50 - 55	Ochre
55 - 60	Orange
60 - 65	Cinnabar
65 - 70	Carmine
70 - 75	Lilac red
75 - 80	Blue
Above 80	Dark blue

Receiver noise level colours

If no results are present, the receivers will appear dark blue.

If you have got noise contours loaded, you can show these as an overlay of the ground.

You can now start the process of generating the 3-D view. Click Save and the process will start. The *NoiseMap* model is converted into a series of planar triangular 3D facets: a complex model may contain many tens of thousands of them. A progress meter will indicate the approximate percentage completion, which will assist you in deciding how long it will take. A large model may take a considerable time.

When completed, the 3-D viewer will open with the model displayed, from the initial viewpoint if that has been set.

THE 3-D VIEWER

If the 3-D viewer is not open, you can start it from the Windows Start menu or from a desktop shortcut if you have one. You must then open the archive file which contains the 3D model. The 3D viewer will appear on the screen.

Direction of view

You can control the direction of view by clicking and dragging the mouse. You can control the height of the viewpoint by scrolling the mouse wheel.

Alternatively, if you press **M** on the keyboard, the direction of view will follow the mouse without the need to click any buttons. Press M again to release this.

Travelling through the model

You use the **keyboard** to control the way you move:

- **W** moves you forwards in the direction you are looking

- **S** moves you backwards away from the direction you are looking
- **A** tracks you left relative to the direction you are looking
- **D** tracks you right relative to the direction you are looking

Speed of travel

You can control the speed at which you move. Firstly, under 'Eye/View' set the base speed (default 100 km/h). Then

- **Ctrl** slows you down to one tenth
- **Shift** speeds you up to ten times the default speed

You press the speed keys in combination with the letter (direction keys). The speed at which you move should not be dependent on your computer, but a faster computer will give smoother movement, as it will display more frames per second. Smoother movement makes it easier to control the travel, since with a slow computer, you will move further with each frame.

Hint: Improving graphics performance

The 3-D viewer requires a graphics card with Open GL support. Cards which provide this in hardware will give smooth, rapid movement even with processor-intensive features such as Fog and Transparency.

Viewpoint information

While the viewer is active, a panel to the right of the viewer gives some information about viewpoint, including

- X, Y position
- Height
- Horizontal angle (0 = north)
- Vertical angle (0 = horizontal)

This may be of help in adjusting your orientation. You can also place yourself at a specific viewpoint by entering values here.

Button R resets the view to the initial viewpoint.

Button P sets the view to a top-down plan view.

Buttons also turn on the rectangular grid and the map axes.

Scene lighting

You can adjust the lighting of the scene by turning the Sun on or off. When the Sun is on, it traverses the sky and affects the direction of lighting, which can make various objects easier to see. You can pause the sun by clicking the Pause button (symbol is two vertical bars) in the toolbar. Button L1 turns the sunlight on and off. Button L2 turns an additional spotlight on and off.

You can also apply 'Fog' which may help to give depth to distant objects.

Receiver results

If you have calculated result for various combinations, you can select the combination to view

The scene

You can turn on, off or show in wireframe the various elements of the scene (Roads, Tracks, Routes, Fixed Workings, Barriers, Ground, Hard/soft outlines, Receivers and Buildings.

If there is no noise contour present, the ground is shown with a surface texture which helps to improve the visual impression.

The ground will normally slope as necessary to meet the edge of the road, but roads which are elevated above the ground (height above local ground is not zero) will appear at the correct elevation and the ground will continue beneath them. If the ends of adjacent road segments are not at the same height, then you may be able to see through the gap to the blue background behind.

If barriers heights have been entered incorrectly, so that one end is below ground level, they can appear as a black 'shark's fin' in the scene.

Ground overlays

If you have calculated and downloaded noise contours, you can turn these on or off in this section. Separately, you can turn on or off the background detail overlay from the noise model.

HINTS ON VIEWING

When travelling, you may hit the ground plane and go underneath it. From the underside, the ground appears black above you, but the bottom edges of barriers protrude below the ground. To regain the air, ensure you are travelling forwards (**W** key pressed) and pull the mouse back so you are facing upwards.

Saving a scene

To save a scene, click the Copy button in the toolbar. Alternatively, press **PrtScr** (the print screen key) to save the scene to the clipboard. You can then open Word, Paint or a similar graphics package and paste the scene, from where you can save it to disc or print it out.

Pointer

Press the **P** key to transmit your approximate current position and direction of view to the *NoiseMap* graphical view. This can help if you have got lost, or simply want to identify an object in the scene.

Quit

Press the **Q** key to close the 3D viewer.

TROUBLE-SHOOTING 3-D VIEWER

The 3-d viewer operates by generating a series of triangular facets that cover the area to be viewed. The first part of the process is to calculate the position of the corners of all the facets (the *vertices*) and then to generate the facets so that they completely cover the area without any overlaps or gaps. This is a complex and computationally-intensive process and for large areas, a considerable amount of RAM is needed. If the computer has insufficient RAM for the size of the view (either in main memory or for the graphical display) this can cause obscure errors, which may be reported as stack problems, invalid instructions and the like.

In such cases, we would advise ensuring adequate main memory (1 GByte or more) and fitting a high-quality graphics card with plenty of on-board RAM.

SOFTWARE FILLING OF NOISE CONTOURS

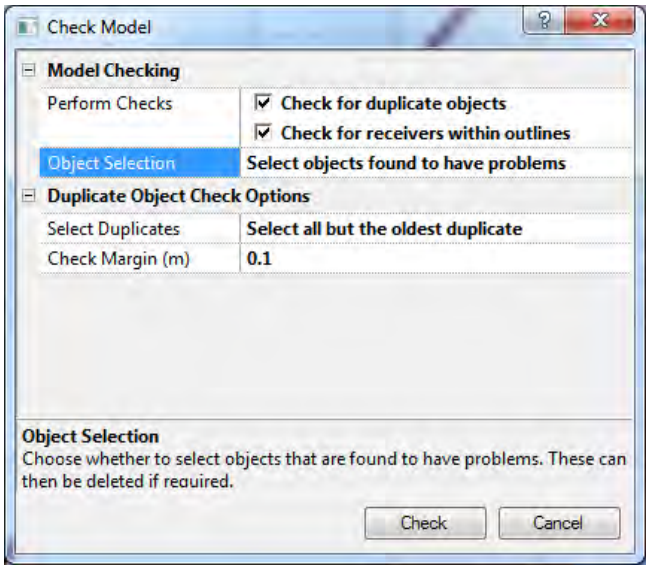
There is occasionally a problem when filling noise contours that causes one particular colour to flood the whole screen. The risk of this is reduced by using Software Fill, which is now the default option. Users who find this too slow can uncheck the box to use hardware fill.

CHECKING FOR DUPLICATE OBJECTS

It is possible, when creating objects from digital mapping, that the same object appears in more than one data source, due to overlaps between maps, etc. This can mean that the same object could be duplicated in the database. Often this may be of no consequence – but sometimes it could lead to errors: for example if a road segment is entered twice, this could lead to a 3 dB error in the noise level.

NoiseMap provides a function that tests for duplicated objects by checking if two objects have essentially the same co-ordinates within a given margin of error. NoiseMap will automatically check for duplicates each time a model is loaded if you go to **`Parameters>Program Options`** and under **`Model Check`** select **`Check Model automatically on load`**.

Alternatively, you can make this check at any time from **`Calculate, Check loaded model.`**



Duplicate Checking

Choose which duplicates are to be selected (if any are found) and the closeness between objects that you consider to be a duplication (default 0.1 m). Then click **Check**. You will probably want to delete the duplicated objects. To do this, in **Object Selection** choose **Select objects found to have problems** and under **Select Duplicates** choose which object are to be selected. You have the choice of **All but the oldest, All but the most recent,** or **All duplicates**. You can also check for any receivers that fall within a (building) outline. When the check is done, pressing **Delete** will remove the offending items.

14. DISTRIBUTED CALCULATIONS

INTRODUCTION

When you wish to calculate a noise map over a large area, particularly where there are many buildings, the calculation may take a significant time. For example, an area 5 km square which is modelled in square 500 m tiles will have 100 tiles. If each tile takes 30 minutes to calculate, the total time will be 50 hours.

A simple way to reduce the calculation time is to have several computers working on the task. This is called a 'distributed calculation' and is available with the Remote Database version of *NoiseMap*. Each participating computer needs to have *NoiseMap* set up on it, and for it to have access to the database containing the tiles to be calculated, usually via a network or the Internet.

The database contains a task list, called the **calculation queue**, which contains details of all the noise contours that are awaiting calculation, including the calculation method and other details. Each computer that is available to undertake calculations is set up to 'listen to' the calculation queue. If it finds a task waiting in the queue, it will automatically load it and set to work. Although the computer will still be available to do other tasks (except for other noise mapping work) this is not recommended as it is likely to be very slow. If you do decide to share the machine, then you should use Windows Task Manager to set *NoiseMap* to low priority.

Any other computer may act as 'client' and add tasks to the calculation queue.

SETTING UP A COMPUTER TO LISTEN TO THE CALCULATION QUEUE

If you wish your computer to collaborate in distributed calculations, you need to connect it to the calculation queue. You should start the software in the usual way, then connect to the database of interest, containing the calculations that your machine is going to assist with. You log in as usual.

Then Select **`File`**, **`Connect to calculation queue`**.

A small window headed **Distributed Calculation** will open. This shows whether there are any tasks in the queue, and if there are it will show progress. A button marked **Quit** allows you to exit from the calculation queue.

The Distributed Calculation window also shows the number of tiles in the queue at the moment the current task commences,

and the number of computers calculating tasks the queue at that time. These are approximate values and depend on the number of computers that have commenced a calculation within the last eight hours. On very long tasks, this number will not be accurate. Also, these values are only updated when the particular computer starts a new tile. For more accurate information, use the Database Administration Tool.

The computer checks the calculation queue once every two minutes and when it finds a task, it will accept it. This causes another calculation progress window to open.

Contour Calculation Progress Bar

This shows the progress on the tile being calculated. If you click the **Abort** button, the computer will drop the current task (it may take some time to respond) and the task will be added back to the calculation queue. Any results from the aborted task will be lost, but results from completed tasks will have been saved in the database. Click **Abort at end** if you wish the computer to continue until the current tile has been calculated. If you check **Close *NoiseMap* on completion**, the software will close down when the calculation is complete. This will prevent *NoiseMap* PAYG dongles from continuing to clock up user time when tasks have been completed. When you Abort or Quit from listening to the Calculation Queue, the machine will be logged off from the database. This is a security measure to reduce the risk of unauthorised people gaining access to the database.

ADDING TASKS TO THE CALCULATION QUEUE

To add a task to the calculation queue, simply set up a database contour calculation in the normal way, as follows:

Each participating computer will take the calculation method and other calculation parameters from the **database**, not from the settings in the machine that is doing the calculations. You set the calculation parameters in the database from the Global Parameters dialogue. The parameter settings in the participating computers are reset to these values. **It is wise to ensure that all participating computers are running the same version of the software.**

From the NoiseMap user interface

- Load the area and scenario of interest
- Ensure you have defined the category combinations to calculate
- Set up the required global calculation parameters (calculation method, cut-off distance, cut-off angle, etc)
- Navigate to **`Calculate`**, **`Calculate database contours`**

- Set up the noise contour parameters (Contour spacing, height above ground, etc)
- Set up the number of tiles surrounding each calculated tile
- Select (highlight) the category combinations to be calculated
- Select **Full precision** calculation

Now you can select either

- **Local calculation** – calculates only on your computer
- **Distributed calculation** – puts the selected tiles in the calculation queue

You should also note that your own machine will not automatically participate in the calculations. This allows you to continue to set up tasks whilst other machines undertake the calculations. If you wish your computer to participate, you must set it up to listen to the calculation queue when you have completed your other work and can dedicate the machine to calculations.

From the database administrator

The database administrator contains a section that allows you to view the calculation queue, and to add, delete enable and disable calculations in the queue. See separate User Guide on how to use the database administrator.

QUEUED INFORMATION

When you queue a calculation, the tile number, scenario, calculation method and calculation parameters (cut-off distance, COD, cut-off angle COA and cut-off for reflections COR) are stored.

The tile and scenario contents are not stored, and any changes to the model between the time that the calculation is queued and the time that each calculation is started will be included in the calculation.

The queued values of the calculation parameters (COD COA, COR) are those present in the computer when the calculation is queued. These will normally be the values in the database at the time the calculation is stored, unless 'session' values have been set. Where calculations are queued from a spreadsheet using the script interface, then the calculation parameters are taken from the spreadsheet.

SPEED OF COMPUTATION

When you have several computers connected to the calculation queue, any differences in speed of the computers is unimportant, as they are all working independently. This simply means that a faster machine will do more tiles than a slower one.

If the results are being held up by a slow machine (or one that has crashed) you should used the database administrator to change the status of the non-completed tile so that another computer can take it over.

The tiles are not necessarily calculated in the order in which they were put into the queue – when a batch of tiles is put in, they will be calculated in the order in which they were originally entered into the database. You can use the database administrator to adjust the order of calculation. If you are calculating a huge number of tiles, it may be advisable to wait for one batch to complete before adding the next batch, especially if you intend to iterate the calculations to remove edge effects.

LOSS OF INTERNET CONNECTION

Occasionally the Internet connection or server computer may be down at the moment that the calculating computer tries to save the result. In such cases, the machine will display a warning and wait until you ask it to retry or abort.

CALCULATION-ONLY LICENCE

A Calculation-only licence allows *NoiseMap* to connect to the calculation queue of a particular database and to undertake calculations that are in the queue. It does not provide access to any other *NoiseMap* functions. This can be an economical way of obtaining extra calculation power.

If you have a Calculation-only licence, only the File and Help menus will be available. The File Menu will provide the following options:

- Establish Connection
- Establish Default Connection
- Connect to Calculation Queue
- Exit

READ-ONLY DATABASE PERMISSIONS

In order to be able to undertake calculations (or to make any other changes to the database), your user account must have read-write permissions for that particular database, irrespective of your *NoiseMap* licence conditions. Your *NoiseMap* database administrator can set different permissions for each user for each database.

15. GRAPHICAL OUTPUT AND PRINTING

INTRODUCTION

NoiseMap can produce scale drawings of noise models or noise map on any Windows-installed printer or plotter. In addition, it can export noise contours as a Picture File in JPEG, PNG and Bitmap formats or as a Digital Drawing in DXF or Shapefile format. See the Index for references to this Manual.

Printouts can be at any scale chosen by the user and can include a title block and a key. The printouts are high quality and suitable for many purposes. However, if you require elaborate presentation drawings, you may wish to export the map and contour data to a drawing package such as AutoCAD.

PRINTING OR PLOTTING A MODEL

NoiseMap can use any printer or plotter with graphical capability installed in Windows to produce a graphical plot of the *NoiseMap* model. Results will be in colour on devices with this capability. The print function is accessed from the File menu option. There are three steps, described below.

Select printer

In order for *NoiseMap* to be able show the area which will appear on your plot, you must firstly select the printing device you wish to use. Click on **`Select Printer`**.

The standard Windows Print dialogue box will be opened. You can select any device installed in Windows and can change the settings of the printer, such as paper size and orientation, if your printer/plotter offers these options.

Show Scale

You now need to tell *NoiseMap* the scale it should use when it creates the plot. Click on **`Show Scale`**. Check the Map Scale On box and type in the scale you require for the plot.

You will now see a rectangle on the graphical display, and the size of the plot will be adjusted to fit the drawing scale you have chosen. You can move the model until the area you require appears inside the rectangle. This is the area of the model which will appear on the plot. Do not zoom the model, or the scale of the plot will be incorrect.

When you have completed the plot, you can remove the yellow rectangle by clearing the Map Scale On check box.

Print

This menu option will be greyed-out until the yellow rectangle appears, after you have selected a printer and shown the scale. When you select this option, the area within the yellow rectangle will be sent to the printer.

Printing options

The **`View, Display options`** menu allows you to set various printing options such as the grid spacing and size of labels. It also allows you to set options that will improve the appearance of printed output on a monochrome device.

There are a number of options for obtaining hard copy from *NoiseMap*:

Print or plot directly from *NoiseMap*: this is quick and simple provided you do not need to process the output first

- Copy to clipboard and use another application: this is suitable provided the screen resolution is adequate (e.g. small size for use in a report)
- Output as DXF file to a CAD package: this can be used for the model, including contours or results labelled on a model plot, but cannot be used with bitmaps and does not re-export an imported DXF file.

Hint - Printer or plotter?

For high-quality output, you need to use a printer or plotter. The distinction between the two is becoming increasingly blurred, but printers cannot always handle graphics, and generally only use small sizes of paper (up to A4 or A3). Plotters have varying degrees of graphics capability and handle larger sizes of paper, generally in the range A3 to A0. Many printers can only do black-and-white, whilst plotters have some colour capability. Pen plotters have a magazine of four to eight pens. These are excellent for line drawing, but unsuitable for large areas of colour fill. Inkjet or laser-type plotters can produce large areas of continuous colour and are best where bitmaps or colour-filled contours are required.

NoiseMap can produce hard copy output on any printer or plotter with graphical capability that you have installed in Windows. To see a list of installed printers and plotters, choose **`File`**, **`Printer`** from the main menu, and choose the printer and paper size you wish to use. Next choose **`File`**, **`Select Scale`** from the main menu and choose the scale you require for the plot. A yellow rectangle will appear on the screen, to indicate the plot area. Use the cursor keys or panning button to scroll the image until you get the required area inside the rectangle, and then go to **`File`**, **`Print`** on the main menu to initiate the print. If you cannot get the required area onto the page, you must either change the scale, use a larger paper size, or tile the plot across several pages. If you 'zoom' the display, this will change the scale, causing the yellow rectangle to disappear.

When you have completed the plot, you can remove the yellow rectangle by clearing the **Map Scale On** check box in the **Show scale** dialogue.

Printed/plotted appearance

The appearance of graphical output on a black-and-white printer can sometimes be improved by selecting:

- Print labels in black (ensures that coloured labels are visible)
- Print colours in greyscale (ensures that colour contours are printed with increasing density)
- Bold characters in title box – some pen plotters will give better output if this is off
- Grid label size – by default the grid labels are subject to the scale of the drawing; tick this box to produce a fixed size regardless of scale, and use the slider to adjust the size, to aid legibility.

COPY VIEW TO CLIPBOARD

The existing view can be copied to the clipboard from where you can paste it into another application capable of handling graphics, such as Word or Paint. Choose **Edit**, **Copy view to clipboard** from the main menu, then switch to the target application. This is not the same as pressing the *Print Screen* (PrtSc) key, which copies the whole display to the clipboard.

16. THE RESULTS OUTPUT WINDOW

INTRODUCTION

The results output window (All Output Window) provides a log of the *NoiseMap* session, plus results of some local calculations. It is not saved automatically, but you can choose to save it when necessary.

The start of the log announces the software title, session start time, and some licence details.

It then logs operations on the database, such as calculating or loading noise contours.

Typical operations logged include:

- Connecting to database/ database version
- Loading tiles
- Calculating noise contours starting
- Calculation completed
- Calculation time
- Loading noise contours
- Loading shapefiles
- Noise contour area analysis
- Execution of script files

Explanations of each of these operations are given in the relevant sections of this manual.

When noise contours are loaded, the tile ID is shown along with details of what the contour represents, and its calculation parameter settings.

When calculating for individual receiver points, the usual calculation data is printed out.

You can also list all the parameters of the currently-loaded model.

The Results Output Window also provides a log of any error message generated by *NoiseMap* during data loading and processing.

For detailed information on the format of this output, press the F1 function key.

POSITIONING THE RESULTS OUTPUT WINDOW

As well as using the normal Windows drag and resize functions, you can automatically position the Output window below the main window by selecting **View**, **Position below main window**.

You can also select **View**, **Move with main window**, so that when you move the main window, the Output window follows.

SCRIPT COMMAND PANE

If you wish to execute a script file or enter a script command, you will need to reveal the script command pane. This will appear as a single line pane at the bottom of the Output Window showing the command-line indicator >>>. To reveal the script command pane, select **View**, **Show command pane**.

SAVING THE RESULTS OUTPUT WINDOW

The Output window cannot be printed directly from *NoiseMap*. You can either save it to a file and then print the file from a word-processor such as Word or NotePad, or you can copy it to the clipboard and paste it to another application.

The output is designed to be viewed in a fixed-pitch font (e.g.Courier New). Full output will print on A4 Landscape paper in 8-point font with margins of about 15 mm. The output is plain text.

Saving output to file

Select **File**, **Save As** from the main menu bar. You will be asked to supply the name of the output file. This will be given the file type **.OUT** by default.

Copying to clipboard

If you wish to copy output to a different application, you can do this by copying it to the clipboard and the switching to the other application and pasting the contents of the clipboard to it.

Firstly select the text you wish to copy. When you want to copy the whole of the Output window to the clipboard, you can use the **Edit**, **Select All** function from the main menu.

Next, select **Edit**, **Copy** (shortcut key: Ctrl+C). The selected text will be copied to the clipboard, from where it can be pasted into another Windows application.

Clearing the output window

After you have saved or copied the contents of the Output window, you may wish to clear it so that you can start a new Output session. Select **File**, **Clear File** from the Output Window menu bar.

FIND FUNCTION

The Find function assists when looking for particular items in a long output. You enter a search term and can choose to search up or down the output. You have options to match the whole word only and to match case (capital or small letters).

VIEW FUNCTIONS

SHOW ALL OUTPUT

The default action is to show all output. This numbers each calculation run and shows the time it started and finished. The results of the calculation are shown to the level of detail selected in the **`Calculation Option`** dialogue box.

Once a calculation has been run, the amount of detail cannot be changed in the Output window. If you need a different level of detail, you will have to re-run the calculation.

The Run numbers can assist navigation through a long output. All Run statistics are preceded by three plus signs (+ + +) to help you to find them.

Warning and Error messages are preceded by three asterisks (***) to assist in finding them. For details on how to interpret the calculation results, use the on-line help (press F1).

SHOW ALL ERROR MESSAGES

This shows only the details of the calculation start and completion times and any error messages produced during the run. Warnings are shown only in the **`View all output`** option.

DISPLAY MODEL PARAMETERS

This function produces a tabular summary of the whole of the noise model as currently loaded. The model objects are grouped by type, as follows:

- Traffic data
- Train vehicle source data
- Train service data
- Plant data
- Activity data
- Road segment objects
- Retained cut objects
- Track data
- Fixed workings data

- Route data
- Noise barrier objects
- Ground contour and ground type objects
- Outline objects
- Receivers objects
- Global parameter settings
- Category settings
- Barrier adjustment settings

Finally, a summary of the number of each type of object is given.

CALCULATE FUNCTIONS

The results window only provides calculation options for individual receiver points. For full calculation options, use the main window.

RECEIVER CALCULATIONS

Receiver calculation options are described in section 11:11.

DISPLAY CONTOUR AREA BREAKDOWN

This is an alternative way of accessing the function which calculates the area covered by each noise contour band. It is described in section 10:15.

OUTPUT

SELECTING OUTPUT DETAIL

The results of the *NoiseMap* run will be printed out with the level of detail that has been specified in the Calculate dialogue box. The various levels of detail are described below. The information about contours and barriers is the same for road, rail and site noise calculations. However the detailed information on the source calculation depends on which type of source is being calculated.

The following section shows the output for a Road calculation.

FULL OUTPUT

```
+++ Calculation Run 4 started at 17:57:18


 656  2 EAST ROAD (REAR)
 HEIGHT OF RECEIVER ABOVE DATUM=  12.9 HEIGHT ABOVE LOCAL GROUND LEVEL=   1.0
 SEGMENT
 NUMBER
    1.0                0.0 ANGLE CUT-OFF
    3.0                0.0 ANGLE CUT-OFF
    4.0                0.0 ANGLE CUT-OFF
    5.0                0.0 ANGLE CUT-OFF



    2.0
```

```
                                                C O N T O U R    A N A L Y S I S
          DISTANCE HEIGHT | DISTANCE HEIGHT | DISTANCE HEIGHT | DISTANCE HEIGHT | DISTANCE HEIGHT | DISTANCE HEIGHT | DISTANCE HEIGHT
              36.5   11.5 |     18.2   12.5 |     14.1   11.5 |      0.0   11.9

           < - - - - - - - - - - - - - - - - - - -    P O S S I B L E     B A R R I E R S    - - - - - - - - - - - - - - - - - - - >
           BARRIER  DISTANCE  BARRIER   C/WAY   POTENTIAL  FRACTIONAL |  BARRIER  DISTANCE  BARRIER   C/WAY   POTENTIAL  FRACTIONAL
           NUMBER   FROM C/W  HEIGHT    HEIGHT  ATTEN      OPEN AREA  |  NUMBER   FROM C/W  HEIGHT    HEIGHT  ATTEN      OPEN AREA
            -1.0      24.1     12.2     10.9     -4.6        0.00     |   -2.0      15.1     14.5     11.3    -11.2        0.00     |
            -3.0       6.9     11.5     11.1     -3.2        0.00     |   -4.0      22.4     11.5     10.8     -2.2        0.00     |
            -5.0      26.4     11.5     11.0     -1.6        0.00     |

           < - - - - - - - - - - - - - - - - - - -   E F F E C T I V E     B A R R I E R S    - - - - - - - - - - - - - - - - - - - >
           BARRIER  ANGLE SCREENED  EFFECT  ANGLE   | BARRIER  ANGLE SCREENED  EFFECT  ANGLE   | BARRIER  ANGLE SCREENED  EFFECT  ANGLE
           NUMBER   FROM    TO      ATTEN   CORRN   | NUMBER   FROM    TO      ATTEN   CORRN   | NUMBER   FROM    TO      ATTEN   CORRN
          *   -3.0  208.9  222.2    -11.4   -11.3   |    -2.0  208.9  222.2    -11.4   -11.3  |*   -3.0  222.2  236.6     -5.9   -10.9
          *   -4.0  236.6  259.1     -5.9    -9.0   |*   -5.0  236.6  236.6     -5.9   -54.7  |    -1.0  222.2  259.1     -5.9    -6.9
          *   -5.0  259.1  260.7     -5.9   -20.6   |    -4.0  259.1  260.7     -5.9   -20.6  |    -5.0  260.7  260.7     -5.9   -44.9

 SEGMENT  DIST  ANGLE   HT  AV HT   PER  SPD   SCRN  MAJOR BARRIER  BASIC  < - - - - - - - - - -  CORRECTIONS - - - - - - - - - - >  SEG-
 NUMBER   ANCE   OF     OF    OF    CENT  CHNG  ANGL  -------------  NOISE   LOW  SUR-  GRAD  ANGLE  HARD  SOFT  BAR-  RET  REFL  MENT
             VIEW  C/WAY PROPN  SOFT                 NO.   HT  ATT  LEVEL  FLOW  FACE  IENT  VIEW   GRND  EXCE  RIER  CUT  TION TOTAL
    2.0   37.9  54.6   11.1   0.6 100.0  1.0  51.8   -2  14.5-11.2   71.2   0.0  -1.0  0.3    -5.2  -4.9  -5.9  -6.7  0.0  2.5   56.2

[With the Full Output option, the above block of information is repeated for each segment and can therefore produced hundreds or
thousands of lines of output.]
```

Full Output

Depending on the level of detail, it is possible to do the following:-

- Check the accuracy of the model; for example that the barriers are the desired height above the carriageway
- Find the attenuation of each barrier
- Find which barriers are effective (eg for barrier design)
- Check the distance of receivers, angle of views, average height of propagation, angle of segment screened
- Check the corrections and to see whether the barrier is more effective than soft ground
- See the contribution from each segment

ONE LINE PER SEGMENT OUTPUT

```
*** Calculation run 2 started at 18:21:16
    Method: L10,18h (2005) Calculation.
 The following barriers will have their heights adjusted as follows:

    ID    H ADJ. |    ID    H ADJ. |    ID    H ADJ. |    ID    H ADJ. |    ID    H ADJ. |
      1     0.0  |      2     0.0  |      3     0.0  |      4     0.0  |      5     0.0  |
      6     0.0  |

 Any barriers chained to adjusted ones will not be altered.



 1 Kingswood Estate
 HEIGHT OF RECEIVER ABOVE DATUM=   4.0 HEIGHT ABOVE LOCAL GROUND LEVEL=   4.0
 RECEIVER COORDINATES = (  5324.3,  4827.4)

 SEGMENT  DIST  ANGLE   HT  AV HT   PER  SPD   SCRN  MAJOR BARRIER  BASIC  < - - - - - - - - - -  CORRECTIONS - - - - - - - - - - >  SEG-
 NUMBER   ANCE   OF     OF    OF    CENT  CHNG  ANGL  -------------  NOISE   LOW  SUR-  GRAD  ANGLE  HARD  SOFT  BAR-  RET  REFL  MENT
             VIEW  C/WAY PROPN  SOFT                 NO.   HT  ATT  LEVEL  FLOW  FACE  IENT  VIEW   GRND  EXCE  RIER  CUT  TION TOTAL
    1.0   71.0   9.3    0.0   2.3 100.0  0.0   9.3    2   8.0-18.3   65.7   0.0  -1.0  0.0   -12.9  -7.4  -4.1 -11.2  0.0  3.7   36.9
    2.0    8.7  17.9    0.0   2.3 100.0  0.0  17.9    3   3.0 -4.2   65.7  -2.3  -1.0  0.0   -10.0   0.3   0.0  -4.2  0.0  4.0   52.5
    3.0   20.8  98.0    0.0   2.3 100.0  0.0  98.0    3   3.0 -7.5   65.7  -0.5  -1.0  0.0    -2.6  -2.6  -1.6  -7.5  0.0  2.7   54.2
    4.0   22.9  31.6    0.0   2.3 100.0  0.0  31.6    6   8.0-18.6   65.7  -0.3  -1.0  0.0    -7.6  -3.0  -1.8  -7.4  0.0  3.1   49.5
    5.0   65.6   2.4    0.0   2.3 100.0  0.0   2.4    6   8.0-15.2   65.7   0.0  -1.0  0.0   -18.7  -7.1  -4.0 -15.6  0.0  2.5   25.8
    6.0  273.9   2.5    0.0   2.3 100.0  0.0   2.5    6   8.0-11.3   65.7   0.0  -1.0  0.0   -18.6 -13.1  -7.1  -7.4  0.0  2.5   28.1
    7.0  308.1   4.9    0.0   2.3 100.0  0.0   4.9    3   3.0 -4.4   65.7   0.0  -1.0  0.0   -15.6 -13.6  -7.4  -7.4  0.0  2.5   30.6
    8.0  276.1   6.2    0.0   2.3 100.0  0.0   6.2    3   3.0 -3.7   65.7   0.0  -1.0  0.0   -14.6 -13.2  -7.1  -7.1  0.0  2.5   32.3
    9.0  312.6   5.4    0.0   2.3 100.0  0.0   5.4    1   8.0-10.7   65.7   0.0  -1.0  0.0   -15.2 -13.7  -7.4  -9.1  0.0  2.5   29.2
   10.0                0.5 ANGLE CUT-OFF

 1 Kinsgwood Estate

 REPEAT NO.  0

   CATEGORY   LEVEL    CATEGORY   LEVEL    CATEGORY   LEVEL    CATEGORY   LEVEL    CATEGORY   LEVEL
          1    57.3           2   -96.0           3   -96.0

*** CONTRIBUTION FROM                              Default IS 57.30 DBA L10,18h (2005)
*************************************************************************************************


*** CONTRIBUTION FROM                             Delivery IS 57.30 DBA L10,18h (2005)
*************************************************************************************************
Errors  :     0
Warnings:     0
```

One line per segment output

At the compact level of detail, with only one line per segment, it is still possible to check the following:-

- Distance of receivers, angle of view, average height of propagation, angle of segment screened
- Determine which barrier gives the most attenuation, and its height
- Check the propagation corrections and to see whether the barrier is more effective than soft ground
- See the contribution from each segment

SUMMARY PRINTOUT

```
+++ NOISEMAP DEMONSTRATION +++

+++ Session started 17:40:54 27/10/1998

-------------------------------------------------------------------------------------------------------------------------------

+++ Calculation Run 7 started at 18:06:25

               RECEIVER                East-west    North-south  Roundabout   All
                                       roads        roads        sections     roads


652  1 EAST ROAD                        70.4         60.2         58.9         70.6
653  11 EAST ROAD                       71.4         50.3         49.4         71.4
653  11 EAST ROAD                       73.6         52.9         52.2         73.6
654  2 EAST ROAD                        72.3         56.7         56.7         72.3
654  2 EAST ROAD                        74.2         59.5         59.5         74.2
655  10 EAST ROAD                       71.9         49.8         49.8         71.9
655  10 EAST ROAD                       73.9         52.6         52.6         73.9
656  2 EAST ROAD (REAR)                 50.3         57.2         50.3         57.2

+++ Calculation Run 7 completed at 18:06:25

Errors  :     0
Warnings:     0

-------------------------------------------------------------------------------------------------------------------------------
```

Summary Printout

The summary format, which prints the category totals on one line for each receiver, is usually used once the model has been fully verified and where the other information is not required for design purposes.

OUTPUT INTERPRETATION

Each page of output is numbered and labelled with the title of the masterfile. The Edit, Find facility can be used to search for any item in the output, such as the ID number of an object or the address of a receiver.

The results of the calculation will be shown to the degree of detail chosen when the calculation options were selected. The following section should assist in understanding these results.

HEIGHT ADJUSTMENT

Firstly, if any barriers have been given a height adjustment, the barrier ID and amount of adjustment (in metres) is listed. This lets you check what adjustments have been applied.

RECEIVER DETAILS

Next the receiver ID (Address), height above datum and local ground level and the receiver X,Y co-ordinates are listed.

SEGMENT NUMBER

The calculation for each segment starts with the segment number at the left-hand edge of the page. In Full output, the following analysis is shown for each segment.

CONTOUR ANALYSIS

This will only appear when **Full Output** has been selected. It shows the distance from the receiver and height above datum of every ground height contour or profile line which the crosses the bisector of the angle of view between the receiver and the segment. The final point (at a distance of 0 m) is the ground height at the receiver. This information is used in computing the average height of propagation for the segment.

POSSIBLE BARRIERS

This will only appear when **Full Output** has been selected. It is a list of all the objects which might provide some barrier attenuation for the segment under consideration. The list reads left to right and then down the page, and give the barriers with the greatest potential attenuation first. It provides:

- The barrier ID number: if this has a dash (minus sign) in front of it, then it is a ground contour or profile rather than a barrier object.
- The distance of the barrier from the carriageway;
- The barrier height above datum at the point where the bisector of the angle of view over the barrier crosses the barrier;
- The carriageway height at the point where the bisector of the angle of view over the barrier crosses the carriageway;
- The potential attenuation (ie if this barrier filled the angle of view alone);
- The fractional open area of the barrier.

EFFECTIVE BARRIERS

This will only appear when **Full Output** has been selected. In each part of the angle of view of the segment, *NoiseMap* fits the most effective barriers from the list of possible barriers. Within each part of the angle of view, there will be a major barrier, and there may be one or more subsidiary barriers in parallel with it. Where there are parallel barriers, they can act to give more attenuation than either would give alone. In each part of the angle of view where this happens, *NoiseMap* regards the barrier with less potential attenuation as a subsidiary barrier, and shows

its details first. Its effective attenuation is the combined effect of the two barriers.

- Barrier Number – the ID number of the barrier under consideration. A dash (minus sign) indicates a ground contour or profile. If the barrier number also has an asterisk in front of it, then there is another barrier between the road and receiver acting in parallel with this barrier.
- Angle Screened From – To: these are the limits of the angle of view from the receiver to the road segment which the barrier screens.
- Effective Attenuation – this is the actual attenuation which the barrier provides in this part of the angle of view. If the barrier is a subsidiary barrier, the effective attenuation is the combined effect of the subsidiary barrier with the main barrier. If the barrier is a main barrier, the effective attenuation is the combined effect of main barrier and all its subsidiary barriers. If the barriers have a fractional open area, then the joint effectiveness of the barriers is calculated, and the appropriate degree of soft ground attenuation is applied to any remaining open fraction. Only the attenuation of each main barrier is carried through to the final result.
- Angle Correction – the significance of a barrier depends not only on the degree of screening which it gives, but also on the angle of view which it screens. For example, a small length without much barrier attenuation may not make a great difference to the total noise level. To allow the user to assess this, the angle correction is shown separately so that the two effects can be distinguished. The significance of a barrier can be estimated by adding the two corrections.

ROADNOISE OUTPUT

SEGMENT SUMMARY LINE

This appears when **Full Output** has been selected. When the 'one line per segment' option is chosen, only this segment summary line is printed. It gives a summary of the calculation as follows.

Segment Number

The segment ID number identifies the segment. They are shown in the Segment Properties dialogue box, and they can be displayed on the plot for ease of reference.

Distance

The tabulated distance is the perpendicular plan distance from the nearside carriageway, extended if necessary, to the receiver. A segment line which points towards the receiver will have short 'Distance' even if the actual road segment is far away.

Angle Of View

This is the total angle subtended by the segment line at the receiver, whether or not it is screened.

Height Of C/Way

This is the height of the carriageway at the bisection of the angle of view of the segment. It is computed from the data entered and will rarely be the centre point of the segment.

Avg Ht Of Propagation

If contours have been defined which cross the bisector of the angle of view for a segment these are used in the computation of the average height of propagation. If no relevant contours have been defined, this value is calculated as the average of the height of the receiver and of the carriageway above ground level.

Percent Soft

This is the percentage of the area between the segment and the receiver point, which has soft ground cover. It takes into account the ground type defined by the segment default and by ground type outlines. If all the propagation is over hard ground, the percent soft = 0% ; if all propagation is over soft ground the percent soft = 100%.

Speed Change

This is the change in traffic speed resulting from the specified gradient and the specified percentage of heavy vehicles. It only applies where the prescribed CRTN speeds have been used rather than measured speeds.

Screened Angle

This is the total of the horizontal angle of view of a segment that is screened by barriers, including contours. Note that it includes all possible barriers, even if they provide no effective screening.

Major Barrier No Ht Att

The number, height and attenuation of the barrier with the greatest attenuation for the segment. Not necessarily the most significant barrier, as it may affect only a small part of the segment. A dash in front of the barrier number indicates that the screening is provided by a contour.

Basic Noise Level

This is the noise level due to the segment, at a reference distance of 10m from that segment, taking into account the volume of traffic flow, the percentage of heavy vehicles and the speed (corrected for gradient). It does not include any gradient correction or surface correction, which are shown separately. It is a notional value, and must not be used as a prediction of the actual noise level at all points 10m from the segment.

Corrections

NoiseMap takes the Basic Noise Level (BNL) and applies corrections to that value for each segment and receiver position. All corrections are tabulated in decibels.

Low Flow Correction

This is the correction that CRTN88 requires for road segments close to a receiver when the flow is less than 4000 vh/18hr or

200 veh/hr. In CRTN88 the low flow correction is included within the BNL, but *NoiseMap* shows it separately for information.

Surface Correction

This is the correction for road surface noise, dependent on the type of surface, its texture depth and vehicle speed defined for the segment.

Gradient

The gradient correction adds to the noise level for flows which are partially or wholly uphill. For level segments, or one-way downhill flows, the gradient correction is zero.

Angle View

The contribution of noise from the segment is reduced by an amount which is dependent on the total angle of view of the segment.

Hard Grnd

This is the distance correction for hard ground propagation.

Soft Excess

This is the excess attenuation, in addition to that tabulated as **HARD GRND**, which occurs when propagation is partially or wholly over soft ground. If the segment has a greater barrier correction, the **SOFT EXCE** value will not be added to the corrections for the segment.

Barrier

The effective attenuation for the combination of barriers within the screened angle tabulated.

Ret Cut

The retained cutting correction for the segment.

Refl'tion

The tabulated value is the sum of the facade reflection (when appropriate) and reflections from any barrier on the opposite side of the segment. Since the facade reflection is always 2.5, subtracting 2.5 dB from the tabulated value for a facade receiver will give the sum of the reflection corrections due to reflectors on the opposite side of the segment.

Segment Total

This is the total noise level of a receiver point due to a segment. It is the BNL value plus the sum of the corrections, but excluding the lesser of the barrier and soft ground excess.

SITENOISE OUTPUT

SiteNoise output is similar to *RoadNoise* output, except that a different source calculation is required, and this produces a different output line, as follows.

<- - ACTIVITY - ->			SOUND	% ON-	EQUIV.	SOURCE ANGLE		MAJOR BARRIER			LEQ	<- - - - - - - - - CORRECTIONS - - - - - - - ->						ACTIVITY
		CATE-	POWER	TIME	ON-	REC.	OF				@	ON-	DIST-	SOFT	BARR-	ANGLE	REFLECT-	TOTAL
NUM.	WRK.	TY GORY	LEVEL		TIME	DIST.	VIEW	NO.	HT	ATT	10M	TIME	ANCE	GROUND	IER		ION	
1/	1	HAU 1	108.0	100.0	-	73.5	9.2	2	8.0	-24.2	80.0	0.0	-8.7	-1.9	-9.7	-12.9	3.0	51.7

Activity Summary Line

ACTIVITY SUMMARY LINE

This appears when **Full Output** has been selected. When the 'one line per working' option is chosen, only this activity summary line is printed. It gives a summary of the calculation as follows.

Activity Number (NUM)

The Activity ID number identifies the activity. It is shown in the Activity Manager dialogue box and in the Workings Properties box. It can also be displayed on the plot for ease of reference.

Working (WRK)

The working ID number shows where this activity is taking place.

Activity type (TY)

This indicates the type of activity:

- Sta – stationary
- Mob – mobile plant on site
- Hau – haul road

Category (CAT)

Identifies the category assigned to this activity at this location.

Sound power level

The sound power level of the plant used in the activity. If you entered an L_{Aeq}, this is the equivalent sound power level.

% on-time

The percentage on-time of this activity.

Equivalent on-time

The equivalent on-time is a correction made in BS5228 to take account of the movement of mobile plant on site along the track segment. It is not applied to other types of activity.

Source-Receiver Distance

The source-receiver distance depends on the type of activity. For stationary plant, it is the distance between the activity point and the receiver. For mobile plant, it is the distance to the nearest point of the activity line to the receiver. For haul roads, it is the perpendicular distance from the track segment, extended if necessary, to the receiver.

Angle of View

This is the total angle subtended by the segment line at the receiver, irrespective of any screening. It is only relevant for activities on a haul road.

Major Barrier

No Ht Att

The major barrier is that which has the greatest attenuation, not considering the angle of view it screens. The following information is provided:

- The ID number of the barrier (a dash in front of the barrier number indicates that this is a ground contour);
- The height of the barrier where is crosses the source-receiver line;
- The attenuation of the barrier.

Leq at 10 m

This is the reference source noise level for the plant as entered or calculated from the entered sound power level. It does not include any on-time, distance, soft ground, screening or reflection *correction factors*, which are shown separately, and must be added arithmetically to this reference level. It is a notional value, and must not be used as a prediction of the actual noise level at all points 10 m from the segment.

Corrections

NoiseMap takes the L_{Aeq} at 10 m and applies corrections to that value for each activity and receiver position. All corrections are tabulated in decibels.

On-time

This is a correction for the percentage on-time of the activity.

Distance

This is the distance correction for hard ground propagation.

Soft Ground

This is the excess attenuation, in addition to that tabulated as **DISTANCE**, which occurs when propagation is partially or wholly over soft ground. If the activity has a greater barrier correction, the **SOFT EXCE** value will not be added to the corrections for the activity. The value is always shown, for comparison with the barrier attenuation.

Barrier

The combined attenuation of all the barriers, including soft ground on any part of view which is not screened.

Angle Cor

This is the reduction of noise attributed to the angle subtended by a haul road segment. It does not apply to other types of activity.

Reflection

The tabulated value is the sum of the facade reflection (when appropriate) and reflections from any barrier on the opposite side of the segment. Since the facade reflection is always 3.0, subtracting 3.0 dB from the tabulated value for a facade receiver

will give the sum of the reflection corrections due to reflectors on the opposite side of the segment.

Activity Total

This is the total noise level at the receiver point due to this activity. It is the L_{Aeq} value plus the sum of the corrections, but excluding the lesser of the barrier and soft ground excess.

RAILNOISE OUTPUT

SEGMENT SUMMARY LINE

This appears when **Full Output** has been selected. When the 'one line per working' option is chosen, only this segment summary line is printed. It gives a summary of the calculation as follows.

Service Number (SVC)

The Service ID number identifies the train service. They are shown in the Train Service Manager dialogue box, and they can be displayed on the plot for ease of reference.

Track (TRK)

The track ID number identifies the track segment over which the service is passing.

Category (CAT)

Identifies the category assigned to this service on this track segment.

Flow

The hourly flow rate of trains on the service. (Note: whatever time period is entered, the equivalent hourly flow is shown here.)

Speed (SPD)

The speed of the service (km/h) on this segment.

Source type (SRC)

The type of noise source –

- ROL – Rolling noise
- PWR – Diesel loco under full power
- FAN – Eurostar fan noise

Length of train (LEN)

The number of vehicles in the train (N.B. Not the physical length in metres.)

Vehicle source correction (VCO)

The vehicle noise source correction factor.

Source-Receiver Distance

The tabulated distance is the perpendicular plan distance from the segment line, extended if necessary, to the receiver. A segment line which points towards the receiver will have short 'Distance' even if the actual segment is far away.

Angle Of View

This is the total angle subtended by the segment line at the receiver, irrespective of any screening.

Major Barrier No Ht Att

The number, height and attenuation of the barrier with the greatest attenuation for the segment. This is not necessarily the most significant barrier, as it may affect only a small part of the segment. A dash in front of the barrier number indicates that the screening is provided by a contour.

Lxx at 25 m

This is the noise level (either L_{Aeq} or L_{Amax} depending on chosen calculation method) due to the train service, at a reference distance of 25 m from that segment, taking into account the train flow rate, the train speed, the number of vehicles in the train and the vehicle correction factor. It does not include any distance, soft ground, screening or reflection factors, which are shown separately. It is a notional value, and must not be used as a prediction of the actual noise level at all points 25 m from the segment.

Corrections

RailNoise 98 takes the L_{xx} at 25 m and applies corrections to that value for each segment and receiver position. All corrections are tabulated in decibels.

Track Correction

This is the correction for track noise enhancement arising from track supports, joints, etc. It is the value entered by the user for each track segment.

Air absorption

This is a reduction in noise caused by air absorption, and is dependent on the distance of the receiver from the segment and on the type of source.

Distance

This is the distance correction for hard ground propagation.

Soft Grnd

This is the excess attenuation, in addition to that tabulated as **DISTANCE**, which occurs when propagation is partially or wholly over soft ground. If the segment has a greater barrier correction, the **SOFT GRND** value will not be added to the corrections for the segment. The value is always shown, for comparison with the barrier attenuation.

Barrier

Railway noise is directional and so the effectiveness of a barrier depends on where it is within the angle of view. (A barrier directly between the receiver and the railway is more effective than a barrier to one side.) The barrier correction printed here has been adjusted to take directivity into account, with the result that the barrier attenuation may be less than indicated under 'Major Barrier' or 'Effective Barriers'. However, it is a realistic indication of the effective amount of noise reduction provided by the barriers.

Ballast

This is a reduction in noise where there is a ballasted track between the source and the receiver. It is not applied if barriers give greater effective noise reduction.

Angle Cor

This is the reduction of noise attributed to the angle subtended by the segment and its directivity relative to the receiver.

Refl'tion

The tabulated value is the sum of the facade reflection (when appropriate) and reflections from any barrier on the opposite side of the segment. Since the facade reflection is always 2.5, subtracting 2.5 dB from the tabulated value for a facade receiver will give the sum of the reflection corrections due to reflectors on the opposite side of the segment.

Service Total

This is the total noise level at the receiver point due to this segment. It is the L_{xx} value plus the sum of the corrections, but excluding the lesser of the barrier and soft ground excess.

SUMMARY OF MODEL

Select **`Edit, Display Model Parameters`** to obtain a tabular summary of the whole model currently loaded, grouped by feature, as follows. These tables can be very extensive and although they can be used for checking a small model, other methods, such as described in Chapter 13, will be easier to use.

- Traffic data
- Train vehicle source data
- Train service data
- Plant data (Sitenoise)
- Activity data (Sitenoise)
- Road segment data (*RoadNoise*)
- Retained cut data (*RoadNoise*)
- Track data (*RailNoise*)

- Fixed workings data (*SiteNoise*)
- Route data (*SiteNoise*)
- Barrier data
- Ground contour data (Ground model)
- Outline data (buildings and other features)
- Receiver data
- Global Parameters (cut-off angles and distances, calculation method)
- Category information
- Model size.

The layout and content of these tables should be clear from the descriptions of the model parameters given elsewhere in this manual, and are not detailed further here.

17. NOISEMAP SCRIPT INTERFACE

The *NoiseMap* script interface provides a text-based method for performing many of the core *NoiseMap* operations. Script *commands* can be entered directly within the *script command pane* or by running a *script file*. Complex operations, bulk model creation, calculation and result generation can all be automated with simple script files. This chapter summarises the capabilities of the scripting interface. A fully detailed manual is available on request.

SCRIPT COMMANDS

A command comprises a one or two-word *command name,* followed by a number of named *parameters*. For example, the *server* command connects *NoiseMap* to a database server using specified user ID and password credentials:

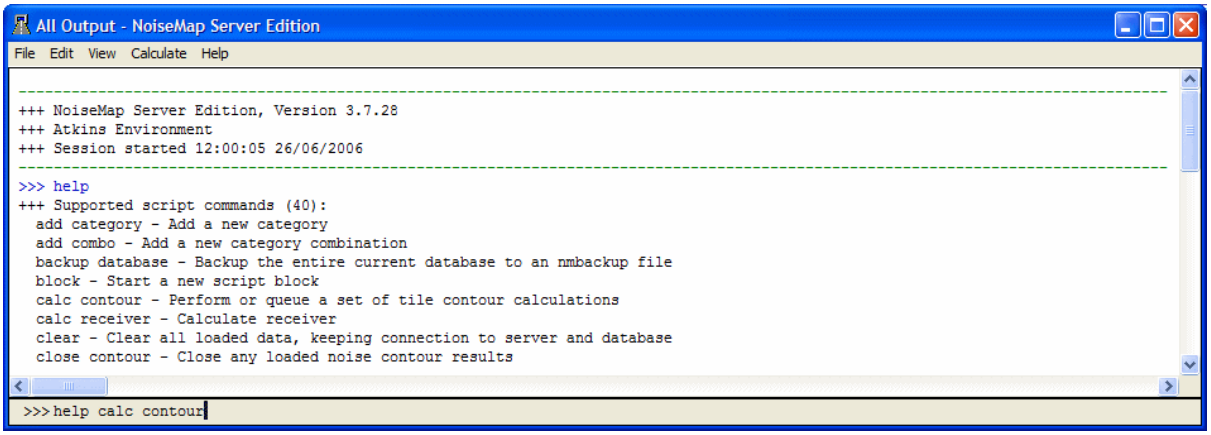
```
server dsn="Local NoiseMap Server" user=adminuser password="xyz$£!!42"
```

The command takes three parameters: *dsn* is the ODBC Data Source Name for the server (as listed in the *Connect to NoiseMap Server* dialog when using the main *File->Connect to Server* menu option); *user* is server user name to use for connecting, and *password* is the user's server password. Some longer parameter names have shortened versions, so *password* can be abbreviated to *pwd*. In addition, for simple commands, parameter names may be omitted so long as all parameters are provided in the correct order. Thus the above command may be simplified to:

```
server "Local NoiseMap Server" adminuser "xyz$£!!42"
```

SCRIPT COMMAND PANE

The script command pane allows the direct entry of commands within *NoiseMap*. The command pane is accessible at the bottom of the *NoiseMap* log/results window. Select *View->Show Command Pane* from the log/results window menu if it is not visible. To execute a command, simply click in the command pane with the left mouse button, type the command and press the Return/Enter key. The screen shot below shows the result of entering the *help* command which lists all available script commands. The *help calc contour* command is about to be executed, this will show more detailed information on the *calc contour* command.



Within the command pane, text can be copied and pasted to/from the clipboard using the standard Windows control key combinations (Ctrl+C, Ctrl+V, Ctrl+X for copy, paste and cut respectively), in addition, pressing the up or down cursor keys will cycle through the history of previously entered commands, enabling earlier commands to be repeated or modified.

SCRIPT FILES

Scripting is most powerful when commands are combined together within a script file, enabling complex operations to be automated. The script file below, for example, connects to the *newmodel* database via the *Local NoiseMap Server* data source, imports and converts a DXF file, commits the changes to the database, performs a calculation and exports the results:

```
# NoiseMap script file test - setup some variables first
set SERVER_NAME "Local NoiseMap Server"
set DXF_DIR "C:\DXF Files"

# Connect to server and database
server %SERVER_NAME% user=adminuser pwd="xyz$£!!42"
database newmodel

# Load multi-layer DXF file, convert ground and commit to base scenario
load dxf "%DXF_DIR%\newmodel.dxf"
convert contours htol=1.0 vtol=1.0 height=lineabs layer=contours
commit scenario=base

# Convert roads and commit to roadschild scenario
convert roads htol=1.0 vtol=1.0 flow=default
add combo "All Roads" category=1    # create a category combination for cat 1
commit scenario=roadschild

# Calculate entire model, load results and export
calc contour method=lden(2005) res=50 ht=4 surround=2 &
             combo="all roads"
load contour area=loaded method=L10 ht=4 res=50 combo="all roads"
export contour fmt=esrigrid file=C:\ContourData\newmodel.txt

# Unload everything
close database
```

In addition to the commands used, this script illustrates some more script features:

- Any text following a # sign to the end of a line is treated as a comment and is ignored.

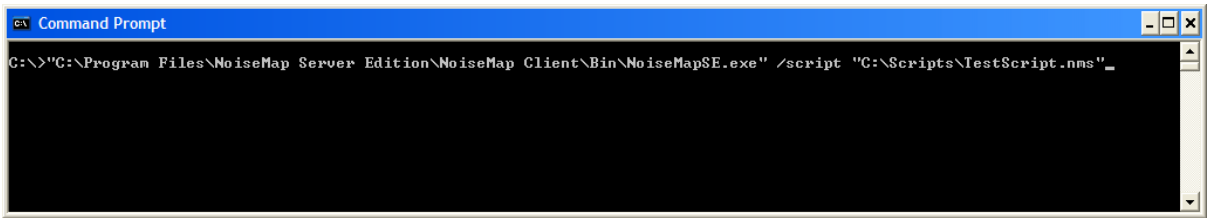
- To extend a command over several lines, an & can be placed at the end any incomplete line (see *calc contour* command above) . Anything on the line appearing after the & will be treated as a comment.
- Variables can be set and used within a script by using the *set* command to set a variable's value (eg. the variable SERVER_NAME is set to the value "*Local NoiseMap Server*" above). Whenever the variable name is encountered in the script surrounded by % characters (eg. %SERVER_NAME%) it will be replaced by its current value.

There are several ways that a script file can be run:

- The *File->Run Script* menu option in the main window brings up a dialog allowing a script file to be selected. Once selected the script will run immediately.
- The *File->Recent Scripts* sub-menu lists the ten most recently run script files, most recent first. Selecting one of these will run the script immediately.
- The *run* command can be entered in the script command pane followed by the script file name. This method allows additional script parameters to be entered (see Script Variables below), for example:

```
run C:\Scripts\TestScript.nms "parameter 1"
```

- One or more scripts can be run automatically when *NoiseMap* starts by using the */script* command-line option. This can be entered either via a specially created shortcut or by running *NoiseMap* from a command prompt, for example:



While a script is running, the script file name will appear in the title bar of the main *NoiseMap* window. The script can be aborted by pressing the *Escape* key and keeping it pressed until the current command has been completed. Some message boxes displayed using the *message* command can also be used to abort a script (see Command Reference section).

CREATING A SCRIPT FILE

SCRIPT EDITOR

Script files can be created using any text editor such as NotePad or a spreadsheet such as Excel. In Excel, they should be saved as a plain Text (Tab delimited) file, not a csv or Unicode file. In other editors, they should be saved as plain ASCII files with no formatting.

You can tell NoiseMap to open your preferred script editor automatically whenever a script error ore report occurs, see Program Options, 4:41.

Any text in the file other than script commands should be enclosed in quotes, eg “text“ (**not** apostrophes, eg ‘text’).

For example, the following spreadsheet can be used to generate a txt file to modify traffic flows:

# An example of a script file created in Excel											
# This traffic flow file adds and updates flows in a scheme											
modify flow	2	"Busy Road"	rate=	10000	speed=	100	phgv=	10	time=	18	corrected= 0
modify flow	3	"High Street"	rate=	20000	speed=	50	phgv=	5			
modify flow	4	"Well Street"	rate=	22000	speed=	50	phgv=	6			
modify flow	5	"Stride Street"	rate=	5000	speed=	50	phgv=	4			
modify flow	6	"Common Road"	rate=	600	speed=	50	phgv=	3			
modify flow	7	"Rattle Road"	rate=	450	speed=	50	phgv=	5			
modify flow	8	"Arnold Avenue"	rate=	15000	speed=	50	phgv=	10			
modify flow	9	"Solomon Street	rate=	30000	speed=	50	phgv=	6			
modify flow	10	"Clematis Close'	rate=	6000	speed=	80	phgv=	6			
modify flow	11	"Winning Way"	rate=	100000	speed=	90	phgv=	7			

To run this file you will need to enter the run command into the scripting pane, eg:

```
run "C:\My Documents\flow.txt"
```

SCRIPT VARIABLES

Script variables provide a means for customising script operation at run time, accessing system-wide settings or simply improving readability and script maintenance. Whenever a variable is encountered within a parameter value (variables can only be used in parameter values), it is replaced by its current value. So in the earlier example, the load dxf command:

```
load dxf "%DXF_DIR%\newmodel.dxf"
```

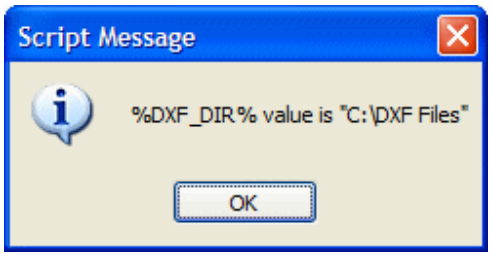
becomes:

```
load dxf "C:\DXF Files\newmodel.dxf"
```

Note that to include a % sign within a string, %% must be used (a similar rule exists for including " in strings). Thus the command:

```
message "%%DXF_DIR%% value is ""%DXF_DIR%"""
```

would be used to display the following message box:



There are four classes of script variable:

- User-defined variables are defined using the *set* command. The variable name can be any combination of alphanumeric characters including any from the set "_.@[]{}():", but must **not** start with a number. A variable can be assigned any value, and will keep that value for all subsequent script runs until it is changed or unset using the *unset* command (this is not the same as setting the variable to an empty string value). This means that variable values can be setup from script files, or even within the command pane, and then be used in later scripts.
- Built-in variables are pre-defined, providing access to certain *NoiseMap* and system parameters. For example, when running a script file, *%LINE_NO%* will return the line number within the file of the current command, while *%DATE%* will return the current date. The value of a built-in variable can be changed by using the set command to create a user-defined version – user-defined variables always take precedence over built-in ones. In this case, the variable must be *unset* to revert back to the built-in version.
- Environment variables, as defined within the operating system, are also accessible as script variables. For example *%PATH%* will return the system search path, *%TEMP%* will return the location of the temporary folder. The current set of environment variables can be shown by typing *set* in a Command Prompt window (or "DOS box").
- Script parameters are string values that are set using the *run* command within the command pane (or *include* command within a script file). Up to 10 parameters may be specified, and are accessed within a script by preceding the parameter number (1-10) with a % sign, for example *%1* for the first parameter, or *%7* for the seventh.

The current values for all script variables (apart from environment variables) are displayed using the *list variables* command. A description of each built-in variable can be found in the reference section.

LIST OF COMMANDS

The following commands are currently available. Most of these commands take extra parameters: see the separate Script Interface Manual or type help *command* in the script pane for details.

Command	Description
add area	Add or modify a database named area
add category	Add a new category
add combo	Add a new category combination
add flow	Add a new traffic flow
backup database	Backup the entire current database to a .nmbackup file
block	Start a new script block
calc contour	Perform or queue a set of tile contour calculations
calc queue	Connect to the calculation queue

calc receivers	Perform or queue a set of stored receiver calculations
clear log	Clear all text from log/output files and reset
clear model	Clear all loaded model data, keeping connection to server and database
clear results	Clear all calculated/loaded receiver results from loaded model
close contour	Close any loaded noise contour results
close database	Close connection to database, clearing all loaded data
close dxf	Close any loaded DXF file
close noisemap	Close *NoiseMap* immediately
close shape	Close any loaded shape file
commit	Commit all changes to the database
compare files	Compare two files, reporting differences found
convert	Convert DXF or Shape file layers to *NoiseMap* objects
database	Connect to the specified database on the current server
delete area	Delete a database named area
delete flow	Delete a traffic flow
delete selected	Delete the selected objects
display contour	Set up noise contour display parameters
end	End of a block, test or loop
exec	Execute a Windows system command or external command-line program
export activities	Export activities and workings assignments to CSV file
export archive	Export all currently loaded model data as a *NoiseMap* archive file
export contour	Export currently loaded noise contour data to an ASCII file
export dxf	Export currently loaded model and noise contour data to a DXF file
export flows	Export currently-load traffic flows to comma-delimited CSV file
export picture	Export currently-loaded model and/or noise contour to file (bmp, jpg, png)
export plant	Export cuttently-loaded plant to comma-delimited CSV file
export results	Export currently loaded/calc'd receiver results to comma-delimited CSV file
export tvehicles	Export currently-loaded train vehicles to comma-delimted CSV file
help	Display script command help
import activities	Import activities and working assignments (optional) from CSV file
import archive	Import a *NoiseMap* archive file into the current model
import flows	Import traffic flows from CSV file, modifying flows with matching flow ID
import plant	Import plant from a CSV file, modifying entries with a matching plant number
import scheme	Import a NoiseMap Enterprise Edition scheme masterfile into current model
import tvehicles	Import train vehicles from CSV file, modifying entries with matching vehicle IDs
include	Include commands from another script file
list databases	List all accessible databases on the current server
list profiles	List all loaded shape file mapping profiles
list variables	List all defined script variables and parameters with their current values
load contour	Load noise contour results for a set of tiles
load dxf	Load a DXF file for conversion
load model	Load all or part of the current model from the server
load profile	Load a shape file mapping profile
load results	Load stored receiver results for specified tiles
load shape	Load a shape file with suitable column mappings for conversion
loop	Loop block start - repeat block commands with iterating loop variable
message	Display a message box
modify flow	Modify an existing traffic flow (also adds a flow if ID does not exist)
optimise database	Optimise database tables and remove unoccupied tiles
output	Output text to log/output window
pause	Pause script execution for a specified time period
remove profile	Remove a shape file mapping profile from the currently loaded set
run	Run another script file in place of the current one
save log	Save output log to a text file
select	Select specified objects
server	Connect to the specified *NoiseMap* server

set	Set a user-defined variable value
stop	Stop processing of a script file immediately
test	Start a new test block

Summary of script commands

18. DATABASE SETUP AND ADMINISTRATION

STAND-ALONE DATABASES

Stand-alone databases do not require any special setup or administration. They are stored as ordinary Windows files and should be treated in the same way. This means that the usual file access and backup security precautions should be applied to them. *NoiseMap* does not provide any special management tools for stand-alone databases. This chapter does not therefore apply to users of the stand-alone system.

REMOTE DATABASES

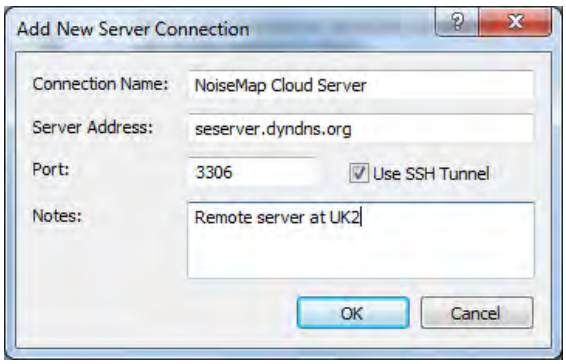
Remote databases are stored on a MySQL server. This is a powerful database engine that needs to be installed on a database server machine, which can be located anywhere convenient – in your own PC, on a network or on the Internet.

The MySQL server and databases must be setup for use by *NoiseMap*, and user accounts must be created to allow access by authorised persons.

This appendix summarises the procedures involved in setting up the server, creating a server connection and administering the database. Detailed 'How-to' Guides are available separately.

SETTING UP A CONNECTION TO A REMOTE DATABASE SERVER

If the remote database server has already been set up, then you must first set up the connection to it. In *NoiseMap*, select File > Connect to server and click the green + button to Add a new server connection. The following dialog opens:



Add new server connection

Enter a friendly name for the connection, and in the Server Address, enter the domain name or IP address. Under notes, you can put any helpful further information. If you require an encrypted connection, tick the box marked SSH Tunnel. Beware that this requires an SSH (secure shell) service to be installed on the remote server. It is not usually necessary for private networks. Click OK and NoiseMap will set up the connection.

INSTALLING A SERVER AND DATABASE

If the remote database has not been set up, then you must gain access to or instal the server hardware and the server software, and then set up individual databases and user accounts.

MYSQL

For the remote server, NoiseMap Ltd supplies a copy of the *MySQL* database engine and the necessary licence along with a set of administration tools. The server runs under Microsoft Windows from NT 4 onwards, but Windows 2000, XP Professional/Server 2003 or later is recommended. There are a number of options for setting up the database and the database server must satisfy certain technical requirements. NoiseMap Ltd will advise on these and provide necessary software and licenses.

Alternatively, you can lease space on NoiseMap Ltd's server, which is available on the Internet.

Once the server is set up, you can proceed to manage the database and user accounts.

DATABASE ADMINISTRATION

THE DATABASE ADMINISTRATOR

If you are running your own MySQL database server, you will need a person to manage it, the Database Administrator.

The routine duties of the Database Administrator are as follows:

- Back-up the database – weekly or more often, depending on the amount of change that is made;
- Create new databases and archive old ones as required;
- Add users and grant them relevant access privileges.

All of the essential operations can be performed using the *NoiseMap* Server Edition Database Maintenance and Administration Tools provided with the Server-Side software, and these do not require any specialist database or network management skills to operate.

Please refer to the *NoiseMap* Administration Guide installed with the tools for full details of how to perform these operations.

USER PERMISSIONS

The Database Administrator gives each user a certain level of access either globally to all databases or separately to each database. For each database, the user can have one of:

- No access
- Read-only access
- Read-write access

If users have no access to a database, then it will not appear in their list of databases.

Read-write access is needed in order to be able to edit a model or to undertake any calculations.

Read-only Access is useful if you wish to give a particular user the ability to look at a model and the results, but not to be able to make any changes or to make any calculations.

Database access restrictions work in conjunction with any licence restrictions; so for example, in order to make changes to a *SiteNoise* model in a particular database, you would need to have both a licence for *SiteNoise* and read-write permission for the database of interest.

Equally, if you have a calculation only licence, you must have read-write access to a database in order to be able to make calculations on it, but you will still not be able to make changes to the underlying noise model.

THE CALCULATION QUEUE

The calculation queue is also held in the database. The Database Maintenance and Administration Tools allow you to:

- View the calculation queue;
- Edit the calculation queue to remove calculations or change their priority;
- Load details of tiles for calculation (and the calculation parameters) from a spreadsheet or external database: this provides a way of managing very large calculation datasets.

COPYING A DATABASE

To copy a complete database, make a backup of it using the Database Administrator back-up tool and then restore it using a new name. The procedure is described in the Database and Administration Tools Manual.

To copy a single scenario from a database, see Index for Copying a Scenario.

DATABASE VERSIONS

On occasions, the format of the *NoiseMap* database will be upgraded to accommodate new features. *NoiseMap* maintains backwards compatibility, so that older databases can be read by newer versions of the software, but older versions of the software cannot read newer versions of the database. When a newer version of the *NoiseMap* is being used on an older database, features which cannot be supported by the database will be greyed out and not available.

If a particular feature is greyed-out, then check that you are using an up-to-date version of the database. Also check that your dongle is licensed for the features that you require.

We strongly advise that if you have multiple users, they all use the same version of *NoiseMap*.

For further information, see the Database Administrator's Guide.

CAPACITY OF *NOISEMAP*

No computer or computer software has infinite capacity. Practicable limits are dependent on such things as available RAM, processor speed, operating system restrictions and data communication speeds.

For *NoiseMap*, one of the primary limiting factors is the amount of RAM available in the computer. This must be shared between all the objects that comprise the model as well as other processes running on the machine. However, a model in a hilly area with tens of thousands of ground contours will need more ground contour storage than a model of a city which is relatively flat, although the city will probably need much more building storage than would be needed in the hilly area.

When the model is already in the database, *NoiseMap* can find out how much storage will be needed for each type of object, and will allocate the memory appropriately. However, when a model is first being uploaded from digital mapping, *NoiseMap* does not know how many objects of each type there are likely to be, so it must make some initial assumptions about this. If these assumptions are incorrect, and the original allocation for a particular type of object is exceeded, then *NoiseMap* will request a bigger slice of memory for that type of object. However, the memory that was previously allocated to that object becomes unavailable for the duration of that run. If this happens many times, then the computer can run out of available memory and the program will be halted.

One approach to this problem might be to allocate vast amounts of memory to every object, but this would result in excessive 'page faulting', ie swapping data to and from 'virtual' memory on the hard drive. This is a relatively slow process, resulting in much longer calculation times, yet it still has a finite capacity.

The approach used by *NoiseMap* is to allow the user to set the initial allocation of the number of each type of object.

The default settings are as follows:

- TrainSegments = 0
- TrainFlows = 0
- RoadSegments = 6000
- RoadFlows = 500
- Barriers = 5000
- GroundContours = 500000
- Receivers = 3000
- IdentStrings = 10000
- Outlines = 100000

These are stored in a file called **nmse.ini** in the program files directory where nmse.exe is stored. Depending on the type of model you are creating and the amount of RAM in your computer, you may wish to change these settings. You should use Notepad or similar to open the file and change the values. Do not delete any identifiers. The values should be higher than the values that you think you will require, although *NoiseMap* will request more memory if it needs it. However, do not be tempted to ask for unrealistic limits as this will simply cause unnecessary page faulting or may exceed what is physically available. The default values will be fine for computers with 512 MByte of RAM. If you have 1 GByte or more, you could increase these values if you wish. Some types of object, such as Road Segments, require much more storage space than simpler objects such as ground contours, so increasing the number of road segments will consume more storage space than a corresponding increase in the number of ground contours.

You can use Windows Task Manager to check on the amount of physical memory available, actual memory used and page faulting that is taking place. If you notice that the amount of memory used by *NoiseMap* is continuously increasing, this is an indication that it keeps having to acquire more memory to accommodate certain objects and at some stage you will have to restart the computer to prevent it from running out of memory.

19. UPDATES AND MAINTENANCE

CONTINUOUS DEVELOPMENT

NoiseMap Ltd maintains a continuous development effort to improve ease of use of *NoiseMap* and to add new features. The development effort also deals with changes to calculation procedures and changes to computers and operating systems.

VERSION CHECK

You can find your version of NoiseMap by selecting Help, About from the menu. This shows the modules that are licensed, the Security Dongle number, the Licensee, Pay-As-You-Go time (where applicable) and licence expiry date if within one month. This, and other information, is also shown at the top of the Output Log window every time NoiseMap is started.

AUTOMATIC UPDATES

So that users can benefit quickly and easily from improvements, *NoiseMap* can automatically check and alert users as soon as an update is available. This will help to ensure that you run the same version on all your computers if you have multiple licences or use several different computers. All you need to do is to select Automatic Update Checking in the Parameters, Program Options window, and to set how often you want *NoiseMap* to check. If your computer cannot access the NoiseMap update site directly (sometime direct connections are blocked by security policies) then you will be prompted to connect via your normal web-browser.

NoiseMap recommends that you activate automatic checking at a suitable interval (7 days is the default). You must be connected to the internet for automatic checking to work.

Alternatively, you can check at any time from the Help, Check for software/Licence updates menu.

MAINTENANCE CONTRACTS

NoiseMap Ltd offers a maintenance contract which entitles you to receive updates during your maintenance period for no further fee. If your maintenance is not current, you would need to contact NoiseMap Ltd either to take out a new maintenance contract or to pay a one-off upgrade fee.

Should NoiseMap Ltd decide to offer an update for all users with a certain version of the software, the update system may permit you to download the update even if your maintenance is not current.

LICENCE UPDATES

A licence is required to run *NoiseMap*, and this is supplied by means of the dongle which must be plugged into the computer that is running *NoiseMap*. The licence permits particular versions of the software to be run, and is valid between certain dates. The licence also contains the maintenance contract status.

The licence can be updated remotely by means of an update code which can be supplied automatically from the *NoiseMap* website.

If you have received a licence update code, then to update your licence, go to Help, Update *NoiseMap* Licence and paste the code into the Licence update window, and click OK. You will then be able to continue using the software, along with any new options that you have licensed.

UPDATE PAY-AS-YOU-GO

The Pay-As-You-Go system is an alternative to a fully-paid-up licence, which avoids the up-front cost of purchasing a permanent licence. You pay for the time that *NoiseMap* is running, either in the foreground or even if it is idle in the background. You are not charged when *NoiseMap* is not running, and user time does not expire after any period of time. For full details on the operation of the system, please see the separate Pay-As-You-Go manual.

You are given an account on the *NoiseMap* website which you can credit with user time. You then download a time-code from your *NoiseMap* account which 'charges up' the dongle with a certain number of hours of use. When this time has been used up, you must download another time code from your account.

With the Pay-As-You-Go system, each time you start the software, the start-up screen will show the amount of time currently remaining in the dongle. You can check the remaining amount of time whenever you wish by selecting Help, About from the menu. You can download more user time by selecting Help, Update Pay-As-You-Go from the menu. If your user time has expired, then *NoiseMap* will offer to take you to the *NoiseMap* website (you must be connected to the internet).

Once connected to the Pay-As-You-Go page, you must log in with your user name and password. Remember that these are 'case-sensitive', ie the login distinguishes between upper and lower case letters, so you must ensure that you use Caps Lock and the Shift Key correctly. Any spaces must also be inserted correctly. When you have entered the details, click the **Login** button.

If you have entered correct details, the *NoiseMap* Main Menu screen will open.

This will show a summary of your account:

- Account balance – the amount of money available for purchasing units
- Discount Points – the number of Discount Points determines the price of units
- Purchase Price – the current price of units based on your number of discount points
- The number of hours of user time you can purchase with your present balance and price of units.

OPTIONS

Get new code

This allows you to use your account to download user time.

Get usage history

This prints out a list of transactions on your account.

Change Password or E-mail address

This allows you to change these items as required.

See how points vary over next 90 days

You earn one discount point for every One Hour of user time that you download. Discount points become operative 30 days after you have downloaded the user time, and remain on your account until 90 days after you have downloaded that time. You do not 'spend' any discount points when you download time. They are a means of reducing the cost if you use the software regularly and intensively.

This option shows how your points will vary over the next 90 days. It will show each date on which your number of discount points changes, both as a table and in a chart. This will enable you to plan downloads to obtain the best price.

GET NEW CODE

To download user time, first click on the **`Get new code`** option on the *NoiseMap* web-site main menu. The **`Code Generator: Step Two`** screen opens. This shows the number of hours you can download from your present balance, at the current price for your account. Please type in the box the number of user hours you wish to download. Then click the **`Go to step three`** button.

Confirmation page

The **`Code Generator: Confirmation Page`** now opens. This will show the number of hours you have requested and the cost. It will also show your new account balance that will be left on your account should you choose to proceed.

If you are happy with the details, click **Proceed** to complete the download. The amount will be deducted from your account. If you do not wish to finalise the download, click on the **Main Menu** button and the download will be cancelled.

If you wish the user code to be e-mailed to your registered address, click the tick-box before clicking the **Proceed** button.

Proceed

Your user time code will be displayed. If you proceed with the download, the **Code** screen will appear. This is a long code and must be copied exactly. Once you have closed the **Code** page, the code will disappear and you will be unable to obtain a replacement if you lose the code or make an error. We therefore suggest that you copy the code by highlighting it with the mouse and then copying to the clipboard by pressing Ctrl + C. Then you can paste it into the *NoiseMap* dialogue box by putting the cursor into the dialogue box and pressing Ctrl + V.

If you choose to e-mail the code to your registered address, this copy will provide a back-up.

Applying the user code

The user code can only be used once. User time codes must be applied in the order that they are obtained.

You may only apply the code to the dongle registered to your account. If you enter the wrong code repeatedly, you will be locked out and will need to contact your agent to have it reset.

CHECKING AND REFRESHING AVAILABLE USER TIME

USING TIME

When you start the software, you will be shown the user time currently remaining in the module. Time will be debited every two minutes, or part of two minutes, that the software is running. Each module has its own time account.

The clock runs all the time that a module is open, whether it is the active window, or running in the background. This is because *NoiseMap* can continue to undertake calculations in the background. To save charges when you are not using the software, you should close it down, rather than simply minimising its window.

When the user time expires, the software will close down and leave a backup file so that no results are lost. When you re-instate the software, the backup will be re-opened. It is possible for a time-consuming calculation to over-run the available time, causing a deficit or 'overdraft' to be accumulated. This overdraft will be subtracted from the next tranche of user time that you download.

CHECKING AND REFRESHING AVAILABLE USER TIME

You do not have to wait for the available user time to expire before you can refresh it.

You can check the user time available in the dongle whenever *NoiseMap* is running. Select **Help, About** from the menu. This shows the amount of time remaining for the current software module. You can download more time from your Web account by clicking on **Go to web-site**, which will connect you to the site. Log on using your account name and password (remembering that each dongle has its own specific account) and click **Get new code**. Follow the procedure to get the code and then return to *NoiseMap*. Put the new code into the box marked **Enter New Code**. The time will be added to the dongle and the new total amount of available time will be shown.

COST OF USER TIME

For current information on the costs of User Time, or to have you account topped up, with more user time, please contact NoiseMap Ltd or your agent.

20. DEFAULT SHAPEFILE FORMAT

SHAPEFILE USAGE IN NOISEMAP

ShapeFiles are an ESRI (ArcView) Geographical Information System file format that contains both the geographical location of objects and also their attributes or properties. A shapefile usually consists of more than one file: one contains the geographical data whilst the others contain the attribute data.

NoiseMap can use shapefiles as one method to import or export both geographical and attribute data. The attributes depend on the type of object that the shapefile represents and are detailed below.

All the *NoiseMap* attributes of an object are exported in the preset format described here. When importing a noise model, the process is most highly automated if shapefiles are in the format described here and are fully populated with all the attributes. However, it is possible to use other shapefiles by specifying their contents, and it is possible for some attributes to be assumed from default settings. Some attributes can be generated within the software. The relevant sections of the manual describe the processes in more detail.

PRESET SHAPEFILE FORMAT

NoiseMap inputs and outputs shapefiles containing the following:

- Road segments and flows
- Building outlines
- Barriers
- Ground contours
- Ground type outlines

The format for each of these shapefiles used on output is given below. This format can also be used as a default when importing shapefiles into *NoiseMap*, so that a shapefile exported by *NoiseMap* can be directly re-imported (it can be round-tripped).

Each shapefile has three files, with the filename extensions of:

- .shp
- .shx

- .dbf

Shapefile attributes

The attributes of each shapefile depend on the type of object that it represents. They are set out in the table below. A full definition is available on request.

Roads Shapefile	3D polylines define road segment position	
Attributes	**Definition**	**Type**
SE_ID	*NoiseMap* internal ID of first road segment in polyline chain	Integer
Roadname	Name of Road (text)	Character String
TOID	ID of road segment external to *NoiseMap*, eg OS OSCAR	Character String
Width	Width of one carriageway) in metres If Cwaytype = 0 or 1, width represents half the total width of the road. If Cwaytype = 2, Width represents the width of one carriageway.	Float
Localht	Height of carriageway above local ground level (in metres)	Float
Groundtype	Type of ground cover surrounding road, defines the default ground type to be used in the CRTN calculation 0 = hard ground, 1 = soft ground	Integer
Category	Identifies the type of road for combining noise contributions from different types of road	Integer
Motorway	Identifies class of road for noise calculations 0 = non-motorway, 1 = motorway	Integer
Cwaytype	Type of traffic flow on road 0 = Normal two-way road 1 = One-way road 2 = Dual Carriageway	Integer
Hrizsep	Horizontal carriageway separation, used if Cwaytype = 2	Float
Vertsep	Vertical carriageway separation, used if Cwaytype = 2	Float

Retcut	0 = road not in retained cutting 1 = road in retained cutting – parameters defined by the following 9 parameters	Integer
Absorb	0 = Retained cut wall not absorbent 1 = retained cut wall area absorbent	Integer
BCL	Distance from road centreline to bottom of cut on left	Float
TCL	Distance from road centreline to top of cut on left	Float
DEL	Depth of retaining wall on left	Float
AGL	Angle to vertical of retaining wall on left	Float
BCR	Distance from road centreline to bottom of cut on right	Float
TCR	Distance from road centreline to top of cut on left	Float
DER	Depth of retaining wall on right	Float
AGR	Angle to vertical of retaining wall on right	Float
Roadsurf	0 = Bitumen 1 = Concrete 2 = Pervious macadam 3 = Manual correction	Integer
Texdepth	If Roadsurf = 0, 1 or 2, contains road surface texture depth in mm. If Roadsurf = 3, contains manual surface correction in dB	Float
Firstbar	The first barrier to be included when calculating this segment	
Flowname	LAEI Description for flow	Character String
LAEI_ID	ID of flow data in London Atmospheric Emissions Inventory	Character String
Flow	Total number of vehicles in required period	Float
Phv	% heavy vehicles in required period	Float
Speed	Traffic speed in km/h	Float
Basis	0 = traffic speed not corrected for gradient 1 = traffic speed corrected for gradient	Integer
Multiplier	Figure applied to LAEI flow to produce the noise model flow contained in this file. This is used to correct for flows on separated carriageways.	Float

Building Outlines	2-D polygons containing building data. Height is applied by an attribute which can contain either a local height (for calculation from the ground model at run-time) or an absolute height.	
Attributes	**Definition**	**Type**
SE_ID	*NoiseMap* internal ID	Integer
Name	Name of building (text)	Character String
Toid	MasterMap Building TOID	Character String
HTMETHOD	0 = Absolute Height 1 = Local Height	Integer
HEIGHT	Height as defined in HTMETHOD	Float

Barriers	3d Polylines defining top of the barrier	
Attributes	**Definition**	**Type**
SE_ID	*NoiseMap* ID of first barrier segment in polyline chain	Integer
Name	Name of Barrier (text)	Character String
TOID	ID of barrier external to *NoiseMap*	Character String
Width	Width of barrier	Float
FOA	Fractional open area of barrier	Float

Ground contours	3d polylines defining ground contour chains (general ground detail and derived side-slope data	
Attribute	**Definition**	**Type**
SE_ID	*NoiseMap* ID of first contour in polyline chain	Integer
Name	Name of Outline (text)	Character String
TOID	ID of barrier external to *NoiseMap*	Character String

Receivers	3d points representing receiver locations	
Attribute	**Definition**	**Type**
SE_ID	*NoiseMap* ID of receiver point	Integer
Recvnum	User ID number of receiver point	Integer
Name	Name (Address) of Receiver (text)	Character String
TOID	Mastermap or other external TOID	Character String
Recvtype	0 = Free-field 1 = Facade	Integer
Localht	Height above local ground	Float
LeftAng	Left-hand limit of angle of view	Float
RightAng	Right-hand limit of angle of view	Float
Floors	Number of additional floor levels for calculation	Integer
FloorHeight	Amount to be added to receiver height for each additional floor level	Float

Hard/Soft Ground detail	2d polylines defining the ground cover type. Lines represent coverage by forming polygons defined in a clockwise direction. Lines representing 'holes' in areas will form polygons that are defined anti-clockwise.	
Attribute	**Definition**	**Type**
SE_ID	*NoiseMap* ID of first point in polyline chain	Integer
Name	Name of Outline (text)	Character String
TOID	Mastermap or other external TOID	Character String
Ground Type	0 = Hard Ground 1 = Soft Ground	Integer

Rail Tracks	3-D Polylines .define the track location	
Attributes	**Definition**	**Type**
SE_ID	*NoiseMap* internal ID of track segment	Integer
Tracknum	User ID for track segment	Integer
TrackName	User Name for track segment (text)	Character String
Toid	MasterMap or other TOID	Character String
Localht	Height of track segment above local ground (in metres)	Float
Groundtype	Type of ground cover surrounding the track. Defines the default ground type to be used in the CRN calculation 0 = Hard Ground, 1 = Soft Ground	Integer
FirstBar	The user ID of first barrier to be included in barrier calculation for this track segment	Integer
MaxSpeed	Maximum speed permitted on this track segment (-1 indicates no limit) (km/h)	Float
TrackCorr	Track Roughness Correction (dB)	Float
RetCut	Correction for retained cutting (Not used)	Float
Ballast	Flag indicating ballast correction needed 0 = not needed; 1 = ballast to left 2 = ballast to right; 3 = ballast both sides	Integer

Fixed Workings	3d Points – define fixed workings for *SiteNoise*.	
Attribute	**Definition**	**Type**
SE_ID	*NoiseMap* ID of fixed working point	Integer
WorkingNum	User ID of fixed working point	Integer
WorkingName	User Name for Working point (text)	Character String
TOID	Mastermap or other external TOID	Character String
LocalHt	Height of point above local ground (m)	Float
Ground Type	0 = Hard Ground 1 = Soft Ground	Integer
FirstBar	The user ID of first barrier to be included in barrier calculation for this working point	Integer

Route Workings	3d Polyline – define route workings (mobile plant) for *SiteNoise*.	
Attribute	**Definition**	**Type**
SE_ID	*NoiseMap* ID of route working segment	Integer
WorkingNum	User ID of route working segment	Integer
WorkingName	User Name for route working segment (text)	Character String
TOID	Mastermap or other external TOID	Character String
LocalHt	Height of route working above local ground (m)	Float
Ground Type	0 = Hard Ground 1 = Soft Ground	Integer
FirstBar	The user ID of first barrier to be included in barrier calculation for this route segment	Integer

21. MENU STRUCTURE

MAIN GRAPHICAL SCREEN MENU

File Menu	Shortcut	Page
New database file	*Ctrl + N*	4:1
Open database file	*Ctrl + O*	4:2
Connect to server		4:2
Connect to database		4:2
Establish default connection		4:2
Load from database	*Ctrl + L*	4:8
Commit changes	*Ctrl + S*	5:20
Database preview	*Ctrl + W*	4:4
Scenario manager	*Ctrl + M*	9:2
Optimise database		5:21
Backup database		18:2
Import scheme		4:9
Import archive		4:10
Export archive		12:5
Clear NoiseMap	*Ctrl + Del*	10:17
Run script		17:1
Recent scripts		17:1
Save log/results output		16:1
Select printer		15:1
Show scale		15:1
Print	*Ctrl + P*	15:1
Connect to calc. queue		14:1
Recent databases		4:3
Exit	*Alt + F4*	10:17

Edit Menu	Shortcut	Page
Copy view to clipboard	*Ctrl + C*	12:2
Edit current selection	*Ctrl + E*	5:1
Add new objects	*Ctrl + A*	5:1
Edit object co-ordinates		5:1
Split object		5:7
Break chain		5:8
Join DXF chains		4:20
Delete selection	*Del*	5:8
Segment tools		4:31
Outline tools		11:8
Measure tool		5:10
Find	*Ctrl + F*	5:4
Find next	*F3*	5:4
Complete chain selection	*Ctrl + R*	5:6
Select chain to start	*Ctrl + Shift + T*	7:5
Select chain to end	*Ctrl + T*	7:5
Undo	*Ctrl + Z*	5:9
Redo	*Ctrl + Y*	5:9

View Menu	**Shortcut**	**Page**
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Load bitmap		4:44
Centre view around bitmap		4:45
Load DXF file		4:16
Load Shapefile		4:22
DXF view options		4:18
Centre view around DXF / shapefile		4:16
Convert DXF / shapefile selection	*Ctrl + D*	4:20
Convert layer		4:20
Export DXF		12:2
Export Shapefile		12:1
Load DXF Landform grid		4:15
Show log/results window		16:1
Show postcode		5:5
Display options		13:3

Parameters Menu		
Edit calculation parameters		4:36
Edit categories		4:38
Edit barrier adjustments		4:40
Traffic flow manager		6:1
Load all traffic flows		6:1
Export traffic flows		12:6
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Train vehicle manager		8:1
Train service manager		8:2
Export train vehicles		12:6
Import train vehicles		8:2
Plant manager		7:1
Activity manager		7:3
Export plant		12:7
Import plant		7:2
Export activities		7:7
Import activities		7:7
Program options		4:40
Convert layer defaults		4:36

Calculate menu	**Shortcut**	**Page**
Check loaded model		13:12
All receivers		11:11
Selected receivers		11:11
Show source contribution		11:15
Calculate database receivers		11:14
Load receiver results		11:15
Clear receiver results		11:15
Calculate database contours		9:1
Load database contours		10:7
Compare database contours		10:6
Contour display parameters		10:9
Close contour		10:15
Export picture		12:2
Export receiver results		11:15
Export contour data		12:3
Display receiver results		11:15
Display contour area breakdown		10:15
Draw cross-section		13:5
Generate 3-D files		13:8

Help Menu		
Contents	*F1*	On-screen
Index		On-screen
Search		On-screen
Update Pay-as-you-go		19:2
Update NoiseMap Licence		19:2
Check for software/licence updates		19:1
About		19:5

ALL OUTPUT (LOG/RESULTS) SCREEN MENU

File Menu	Shortcut	Page
Save as		16:2
Clear File		16:2

Edit Menu	Shortcut	Page
Copy	*Ctrl + C*	16:2
Select all	*Ctrl + E*	16:2
Find	*Ctrl + F*	16:3
Find next	*F3*	

View Menu	Shortcut	Page
Show all output		16:3
Show error messages		16:3
Display model parameters		16:3
Show main window		
Position below main window		16:2
Move with main window		16:2
Show command pane		16:2

Calculate Menu	Shortcut	Page
All receivers		16:4
Selected receivers		16:4
Display contour area breakdown		10:15

Help Menu	Shortcut	Page
Help on text output	F1	

KEYBOARD SHORTCUT SUMMARY

Selecting objects

- **Shift + Mouse click**: Add to current selection
- **Ctrl + R**: Complete chain selection
- **Ctrl + T:** Select to end of chain
- **Ctrl + Shift + T:** Select to start of chain
- **Shift + Right cursor:** tab forward along chain
- **Shift + Left cursor:** tab backward along chain
- **Ctrl + D**: Convert DFX selection to NoiseMap model
- **Escape**: Clear selection

Selecting tiles

- **Left click**: Toggle selection
- Ctrl + Left click: Select
- Shift + Left click: Deselect

Editing

- **Ctrl + A:** Add new objects
- **Ctrl + E**: Edit current selection
- **Ctrl + X:** Reverse segment chain
- **Ctrl + Z**: Undo last action
- **Ctrl + Y:** Redo last action
- **Del**: Delete selection
- **Ctrl + F**: Find objects
- **F3**: Repeat last find

Adding objects

- **Escape**: Remove last added object
- **Shift + Left Click**: Close loop (chained objects)
- **Shift + Left Click**: Define free-field receiver (when adding receivers)
- **F10**: Close loop (digitiser)

Graphical View

- Page Up: Zoom in
- Page Down: Zoom out
- Cursor left, right, up, down: Pan in direction
- **Ctrl + cursor right:** Rotate right (clockwise)
- **Ctrl + cursor left:** Rotate left (counter-clockwise)

Results/log window

- **Ctrl + C**: Copy current selection to clipboard
- **Ctrl + Home**: Move to start of text output
- **Ctrl + End**: Move to end of text output
- **Ctrl + F**: Find text
- **F3**: Repeat last find

Dialogue boxes

- **Tab**: Move forwards through dialogue box inputs
- **Shift + Tab**: Move backwards through dialogue box inputs
- **F9:** Confirm changes
- **Ctrl + C**: Copy text selection to clipboard
- **Ctrl + V**: Paste text selection from clipboard
- **F1**: Context-sensitive help
- **Escape**: Exit help

Database

- **Ctrl + N**: New database file
- **Ctrl + O**: Open database file
- **Ctrl + L**: Load from database
- **Ctrl + S**: Commit changes
- **Ctrl + W**: Show database previewer
- **Ctrl + Del**: Clear NoiseMap

Output

- **Ctrl + P**: Print
- **Ctrl + C**: Copy current view to clipboard

Termination

- Alt + F4: Exit

22. INDEX